The
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The Domestic Load

WHEREVER man makes a supply of electricity available for everyday purposes its merits are quickly proved and appreciated.

Because it lightens the labour of the home, substitutes beauty and brightness for dullness and gloom, brings cleanliness and a healthy atmosphere, and does for us so many things that cannot be done by any other means, it carries its own recommendation with it wherever it goes. During the past decade or two it has established its indispensability to the modern household. The house that is not employing electricity for some purpose or other to-day is indeed peculiar.

Every week the pages of this REVIEW tell the encouraging story of progress that is taking place, and there are no signs whatever that anything is going to happen to prevent the advance; indeed, there is still so much scope for our activities that the business of domestic electricity supply bids fair to become a much bigger thing than we have known it, during the next few years, with a continually growing demand for the thousand and one kinds and types of apparatus that this involves.

Though it has become a habit with many of us to entertain these hopes with regard to what will happen in Britain, it is well to note that they are probably equally applicable in many countries overseas, where our home experience should give manufacturers and traders an excellent opportunity. Is there any reason why British electrical domestic goods should not have the same world-reputation for high quality and suitability as has been secured for other British manufactures?

Whatever may lie some distance ahead of us, however, we have reached one of those times when we especially concentrate on the trade of the season—when we review the more recent developments that have been introduced by the makers of all classes of domestic electrical appliances.

We hope that the editorial comments and descriptive notes that are published in this Annual Domestic Number of the ELECTRICAL REVIEW will be of service as a "work of reference" for some time to come to electricity supply and power undertakings, also to installation contractors, wholesalers, retailers and dealers, as well as to stores, export merchants, and all others who are buyers or sellers of these products.

We further hope and believe that the information thus brought together will be welcomed by other readers, who, though not directly engaged in the "domestic trade," desire to keep themselves informed of the new ideas and developments that manufacturers have embodied in their appliances and devices—the fruit of newly-gained experience or research and design which mean so much in a naturally changing department of electrical activity.

The Electric House

WE remember that some years ago at the Institution of Electrical Engineers Professor Parker Smith gloried in the accusation that he was an "enthusiast" for the all-electric home. Readers of his article in this issue will probably agree that his enthusiasm has been justified by events, as in the case of thousands of other houses all over the country that have since been electrified. Nevertheless, there are no grounds for complacency, as Miss D. Vaughan shows in her constructive criticism of the present "workshop of the home." She maintains that there is a very urgent need for a planned kitchen to derive from electricity all the benefits that it can give. A critical attitude is also adopted by "Cincinnatus," who expresses views, that will appeal to many, as to why we are not securing the bulk of the cooking load in new houses, in which, also, a perhaps non-recurring opportunity is presented for the installation of water heaters. The introduction by an increasing number of undertakings of specially low rates for water-heating indicates a growing appreciation of the high return on capital outlay yielded by this class of load. Even if the

cost of electricity is in some cases more than that of less convenient methods the consumer who has the means is, as Mr. J. I. Bernard implies, generally willing to pay more for the improved service.

American Report on Our Progress

According to the *Electrical World*, the application of certain features of the British grid system to the power development programme of the Federal Government may result from the visit to this country of Mr. David E. Lilienthal and Mr. Llewellyn Evans, the chief electrical engineer of the Tennessee Valley Authority. We commented upon this visit in our issue of August 24th, p. 235, when discussing the appointment of a National Power Policy Committee by President Roosevelt. Our contemporary says that while Mr. Lilienthal on his return declined to state his findings until he had submitted a report and recommendations to the T.V.A. and the National Power Policy Commission, he did say that power development both in England and Ireland was making rapid strides, with per capita consumption showing a remarkable increase. In his estimation one of the most encouraging signs observable here was the installation of electric ranges and other heavy-use appliances in most of the new housing projects. In the course of a speech at an important electrical gathering where electric home matters were receiving special attention he expressed the view that consumers should be protected against inferior electrical appliances through the medium of a consumers' laboratory to be operated under Government auspices. He advocated the conduct in such a laboratory of research for the improvement of designs, and the initiation of new designs which would make electrical appliances better adapted to the needs of the average family.

Small Consumption, but—

It was encouraging to hear from manufacturers during the investigations upon which our article on refrigeration developments (p. 531) is based that supply authorities are taking a far keener interest in the subject than formerly. This reflects another stage in the progress from the old idea that the value of any class of load depends primarily upon the amount of energy it takes. Individual refrigerators may not add much to the output of an undertaking directly, but indirectly they do. Apart from the publicity value (including the important one of automatic control) that they give to electricity in the home—a value which they share with the clock and the all-mains wireless set—refrigerators, like wash boilers, help to keep out gas. The interest now being shown by the gas industry in the potentialities of refrigeration is significant.

Selling Electrical Goods

The door-to-door appliance canvasser periodically comes in for criticism. Householders not unreasonably object to being worried without notice by callers who are bubbling over with the story of the merits of something that they must sell in order to keep the wolf from their own door. Their enthusiasm frequently leads them beyond the bounds of discretion, and they may end by doing more harm than good to those who employ them. Often enough they are well-educated men who in hard times take up a solely sales commission job as a last hope in their search for something to do. For such, who can help having pity? The blame lies with those who employ them on such terms. The Courts have had many cases before them of men who have succumbed to temptation when a transaction has been accompanied by cash payments. It is regrettable that any part of the electrical appliance trade should have been mixed up with this sort of thing. To begin by antagonising a possible customer is sheer folly. Electricity supply and gas authorities in some places make a practice of notifying householders when a representative is likely to call, and a day is specified, an arrangement which prevents the domestics from mistakenly showing a caller into the drawing-room. Reputable electrical contractors also sometimes give notice. Without saying a word to prevent deserving men from earning an honest living, we believe that the electrical trade will do itself no lasting good by surprise door-to-door calls. Proper organisation and fully accredited and properly paid representatives are necessary in order that our salesmanship shall be successful and above reproach.

Price and Service

If curves could be plotted to show the relative values of the rate per kWh and good service in increasing the output of electricity, we should expect them to show that, below a certain point for any given class of load, further concessions to consumers would be progressively more effective in the form of improved service rather than lowered tariffs. The review of tendencies in cooker design included in this issue seems to indicate that we have come to a somewhat similar critical point with regard to cooker development and prices. Though there is still ample scope for reduction in the prices of cookers, the inclusion of improvements in detail by manufacturers and prompt maintenance by supply undertakings are becoming even more important; the new electric vans put into use by Mr. J. W. Townley in West Ham (described on another page) strike the proper note, "service." The help towards lower cooker prices that would be obtainable from standardisation is still a long way off, to judge from the great diversity of designs available. In so far as these represent well-founded opinions, the respective merits of which can be revealed only after experience under practical working conditions, there may be ultimate gain in not forcing the pace towards uniformity.

Exports Move Upward

The increase of £150,483 in the September electrical exports as compared with the corresponding month of last year raises the total advance so far this year to £1,153,879, which is equal to over 17 per cent. Both electrical goods and machinery showed increases, but it should be pointed out that whereas in January-September, 1932, the total value of machinery exported was £2,812,461, in the period under review the total was only £2,314,005. Generator and motor exports were greater, but there was a substantial decline in starting and controlling gear, static transformers, and unenumerated machinery. The increase in the exports of goods and apparatus was contributed to by all items except telegraph and telephone equipment and primary batteries. All customer-countries increased their purchases with the exceptions of China, France, Italy, Belgium and Denmark. Although electrical imports have shown a falling tendency during the past three or four months, the total for the first nine months of the year is £639,870, or 35 per cent. higher than for the corresponding period of 1933.

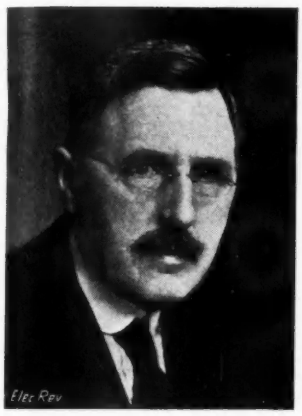
Hams Hall Extensions

It was only on August 3rd that we reported the projected extension of Hams Hall power-station by the installation of a 50,000-kW turbo-alternator with enough boilers to bring into effective use the 30,000-kW "frequency-change" set also. This will make the generating capacity of the undertaking 248,000 kW, a somewhat exiguous margin considering the rapid developments in Birmingham. The m.d. by local consumers last winter of 195,000 kW represented a growth of 18,000 kW over the previous year, and taking this into account, as well as the increasing export to the grid, stock has been taken of the probable position before the end of 1937. It has now been decided to add another 50,000-kW unit, at a cost of £1,161,000. The capital expenditure per kW installed appears high considering the capacity of the proposed unit, but it includes the provision of main trunk feeders, switchgear in sub-stations, and buildings for a further set later. Some details are given in this issue.

Ten Years in an All-electric House. By S. Parker Smith, D.Sc.

The calculation of the costs of running a house all-electrically and the comparison of such costs with those of other means is not the simple business which it appears to be on the surface. The work needs to be carried out in a scientific, methodical fashion, and Dr. Parker Smith can be relied upon to treat the matter properly. In this article he follows up information which he has already contributed to our pages, and as his figures cover a decade they can be taken as more representative of the continued ordinary usage of electricity in the home than the comparatively short-period figures which are often quoted.

ON June 30th, 1934, the tenth year of electric working in the ten-roomed house built by me in 1924, in Glasgow, was completed. The house was fully described in the *Journal* of the Institution of Electrical Engineers (Vol. 64, page 289) and in the ELECTRICAL REVIEW (Vol. 101, page 663, and Vol. 105, page 633). In the last-mentioned article I gave the results of five years' working and I can now supplement this information. In the accompanying table the figures for the whole ten years are given, the figures for the first five years being repeated for ease of comparison. The normal household consists of five persons.



[*Elliott & Fry*

Dr. S. Parker Smith is Professor of Electrical Engineering at the Royal Technical College, Glasgow

During the period of ten years, consumption has risen by nearly 50 per cent., while the annual cost has risen by a much smaller amount, the annual consumption in the second five-year period being greater than in the first five-year period. The fall in the second year was possibly due to the house being drier, while the sharp drop in the third year is accounted for by the general strike.

After the first few years, however, it had become clear that there was no need to be too careful, provided waste was avoided. Consequently, while the fixed charge was falling, consumption was rising. The last two years show a marked drop in the night load and a marked rise in the total load. The chief reason for this is the change in water heating. The 87-gal. tank has a three-heat switch (4, 2 and 1 kW).

Originally the tank was switched on to medium position during night hours only, to obtain the cheaper rate, so that the daily consumption was roughly: 8 hours×2 kWh per hr.= 16 kWh, costing 6d. at ¾d. per kWh. For the last two years, approximately, the switch has been left on the low position almost continuously, thereby increasing the daily consumption to 24 kWh, and the cost to 11d. (16 kWh at ½d.+8 kWh at ¾d.). This accounts for an extra 8 kWh per day, or roughly 2,800 kWh per annum. With the earlier arrangement, the water temperature averaged 120 to 140 deg. F.; at present it averages 140 to 160 deg. F. The benefit gained is that everyone in the household can have a hot bath daily, except in extremely cold weather.

The reason for the comparatively small increase in the cost is the sharp drop in the fixed charge from £12 10s. to £5 10s. Not only has the consumption during the ten years risen from about 16,000 to nearly 23,000 kWh, but the former figure included 6,000 kWh at the low rate against 4,000 kWh in the latter.

This, however, is not the end of the story. After three reductions in the fixed charge, the Glasgow Electricity Department now announces a reduction in the tariff from ½d. to ¾d. per kWh. Taking the day consumption for the tenth year, this means a further cut of nearly £10. Adding the reductions in the consumption charge and in the service charge, it is seen that after ten years, there is a saving of £17 10s., in other words, 24,000 kWh are now to cost about the same as 16,000 kWh at the outset. This welcome result of course was entirely unforeseen, and it offers a sufficient explanation for making greater use of the facilities offered.

This is the house to which this article relates

The table has been extended to show the overall cost per kWh. At the new rate, this figure will fall to well below ½d.

As regards equipment, apart from renewals consequent on improvements, the chief new item is a refrigerator installed in 1932. In addition to other advantages, it is useful to have a place in the kitchen where food can be stored.

In the previous reports an analysis of the consumption was made, showing the amounts used for room heating, water heating, cooking and lighting. This is no longer possible, because, when in 1930 the supply was changed from d.c. to 50-cycle a.c., the separate meters were removed and were not replaced. There is no reason to think, however, that the ratios obtained for the first six years have appreciably altered; namely, room heating and water heating, each 40 per cent. of the total, cooking 12½ per cent. of the total, the remaining 7½ per cent. of the consumption being accounted for by lighting and auxiliaries.

Referring to the table again it should be noted that for the first five years the fixed charge was 12½ per cent. of the rental value of £100; in the sixth year 10 per cent. of the rental value of £110; from the seventh to ninth years 15s. per room; and for the tenth year 20s. for the first room and 10s. for each additional room.

The house was usually closed for a week or fortnight in each year, but as this was in summer, when the consumption was small, the effect was negligible.

A RECORD OF TEN YEARS' CONSUMPTION IN AN ALL-ELECTRIC HOUSE

TOTAL CONSUMPTION IN kWh RECORDED ON TWO-RATE METER

July to July.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.	1931–32.	1932–33.	1933–34.	Annual average.	
Year (52 weeks).	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	kWh.	Percentage.
Day load...	10,299	9,713	9,079	10,727	11,720	13,008	12,776	13,756	17,027	18,774	12,688	69
Night load	6,043	5,827	5,241	5,848	5,897	6,131	6,067	6,928	4,496	4,167	5,664	31
Total for year	16,342	15,540	14,320	16,575	17,617	19,139	18,843	20,684	21,523	22,941	18,352	100

TOTAL ANNUAL COST OF ENERGY.

	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
Day load at ½d.	21 9 2	20 4 8	18 18 3	22 7 0	24 8 4	27 2 0	26 12 4	28 13 2	35 9 6	39 2 3	26 8 8	58
Night load at ¾d. ...	9 8 10	9 2 1	8 3 9	9 2 9	9 4 3	9 11 7	9 9 7	10 16 6	7 0 6	6 10 3	8 17 0	20
Fixed charge	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	11 0 0	7 10 0	7 10 0	7 10 0	5 10 0	10 3 0	22
Total for year	43 8 0	41 16 9	39 12 0	43 19 9	46 2 7	47 13 7	43 11 11	46 19 8	50 0 0	51 2 6	45 8 8	100
Average cost per kWh.	0.637d.	0.646d.	0.664d.	0.637d.	0.628d.	0.598d.	0.555d.	0.545d.	0.558d.	0.535d.	0.594d.	—

Kitchens and Electrical Apparatus. By Dorothy Vaughan*

Some practical suggestions

It is interesting to consider whether the present-day effort to improve general conditions in household management would have developed more rapidly if a greater proportion of menfolk were interested in and had to perform domestic tasks.

TREMENDOUS developments have taken place in connection with the design of electric domestic apparatus, but we are coming now to the stage where progress in design is being slightly arrested by a problem outside the electrical industry—that of insufficient kitchen space in house-planning which makes it impossible to give the housewife perfectly designed labour-saving appliances.

This "workshop of the home" has for too long been pushed into the smallest and most inconvenient spot in the house-plan, with the result that many people who would equip their kitchens with up-to-date electrical apparatus and appliances are unable to do so. It would, therefore, seem advisable to persuade the architect and builder that this all-important department of the home should not only be well planned, but that sufficient space should be allowed for apparatus in order that design of electrical equipment should not be controlled by lack of kitchen accommodation.

A combined effort now in house- and apparatus-planning would build up an industry of British electrical domestic equipment incorporating in its design not only the essentials necessary for its success but the full advantages of this flexible power and perfect fuel, for unless the application is good, many selling points and advantages are lost. For those interested in the sale of electrical apparatus, scientific home management and motion study form a new angle from which to approach the domestic electrical problem.

Visiting some working-class housing scheme homes recently, I realised how tremendously electrical apparatus eased the daily task of keeping house and that the often erroneously used phrase "labour-saving" really does apply, particularly when there is practically no working space. Where a kitchen was little more than a passage, the electric iron had made it possible to carry out the rather tiresome job of ironing in another and more comfortable room. A small electric wash-boiler permitted the removal of an old-fashioned copper, the space gained being used for an electric cooker (previously the cooker had been a coal range in the living room). This is good, but in planning and equipping kitchens in new houses and housing schemes, allowance should be made for ideally designed electrical apparatus which, as we progress, must become a necessity.

A kitchen designed by the American General Electric Co.

Every housewife would prefer a table-type range or cabinet cooker, but at the moment the cost of this design is too high owing to the lack of demand; if more people had sufficient space to accommodate table ranges, the concentration on manufacture of this type of cooker would make the proposition a reasonable one. The small electric cooker is a very excellent product, and the oven is on fairly long legs thus giving a convenient working height to the hob and, at the same time, raising the oven from the floor; in the larger models, however, the ovens necessitate considerable stooping, which seems a great pity.

The Home Laundry

The home laundry problem is easily solved by electrical aid, but again space is often the deciding factor when a housewife is contemplating the purchase of an electric washing machine, as those who are selling this appliance know only too well. The day when the space by the sink (the obvious place for the washing machine) is provided with a well-designed drain board, removable for washing days, and a suitable arrangement for running off the washing water, will mean a considerably increased sale of washing machines; every household has a certain amount of home laundry to do, and a machine in readiness for use tends to help the average housewife to do washing in small quantities rather than have a big tiresome wash day.

The drying of clothes need not be a very difficult task if provision for a drying cupboard be made, or if there is space for a drying cabinet with a fan and a sufficiently heavily loaded heater incorporated in its design, or a ventilated cupboard in which such a unit could be fitted. The vacuum cleaner, floor polisher, and other small appliances need homes, and a cupboard suitably designed for them invites purchase.

Efforts to Effect Improvement

Women of to-day accept as a compliment the fact that engineers have spent much time and money producing electrical equipment for the kitchen and household, and have shown their appreciation by purchasing or hiring apparatus. It should be borne in mind that the housewife does not intend to be destructive in her criticism of any new appliance she may have; if she criticises, it means she is thinking it costs no more to have a thing designed to be really practical than only partly so. Is there any man really satisfied with his car? In the same way women help progress in the design of kitchen and household apparatus, but in order to give the housewife what she really wants there must be more space.

A Fatigue Saving and House Planning Committee already exists in this country and is trying to interest the architect and builder in kitchen planning. The Committee is composed entirely of women representatives from the gas and electricity worlds (Miss Haslett representing the latter), and experts in domestic science, psychology, architecture, housing, etc. The British Colour Council has also associated itself with progressive efforts in this direction, and has brought out a colour card on which may be seen varying shades known to be practicable and attractive for kitchen and household purposes. These cards are helpful in giving the manufacturers of tiles, linoleum, and domestic equipment generally, a very sound idea of the colours which have proved popular with housewives for household use, and the manufactured goods can be finished accordingly.

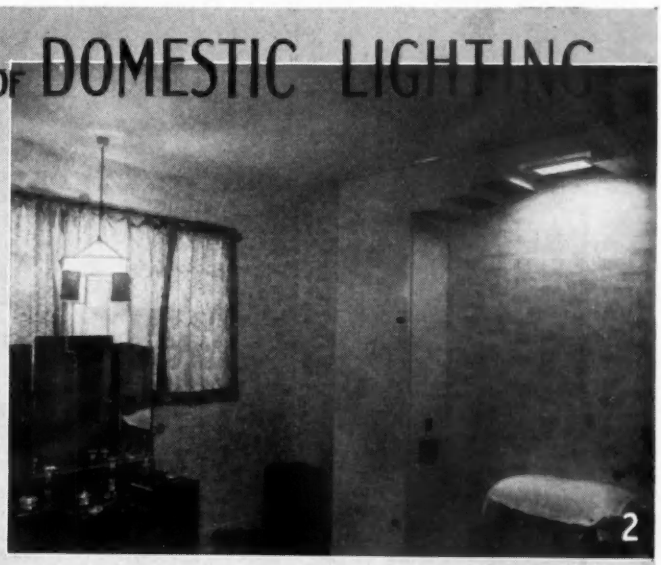
American Ideas

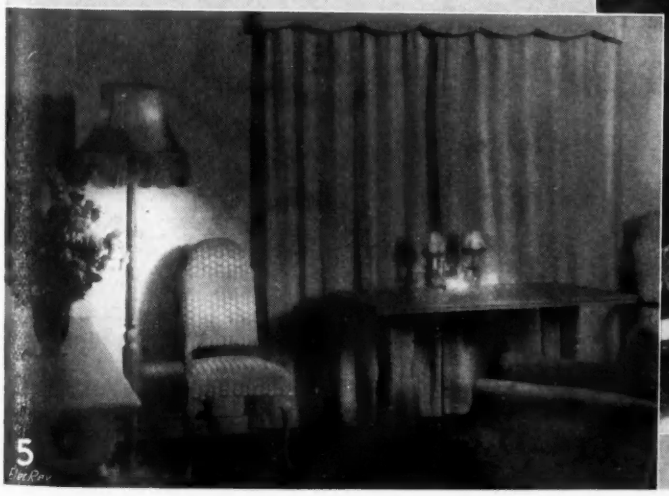
A well-known engineer recently visiting England from the United States spoke of the electric kitchen units now being designed and sold in that country; these may be purchased piece by piece. The unit idea is a good one. As an example, one big manufacturer in this country has been conducting experiments in the layout of kitchens and designs of sinks, etc., which have shown conclusively that a cupboard taken to the ceiling is far less noticeable in a room than one leaving a gap of about 8 to 12 in. at the top.

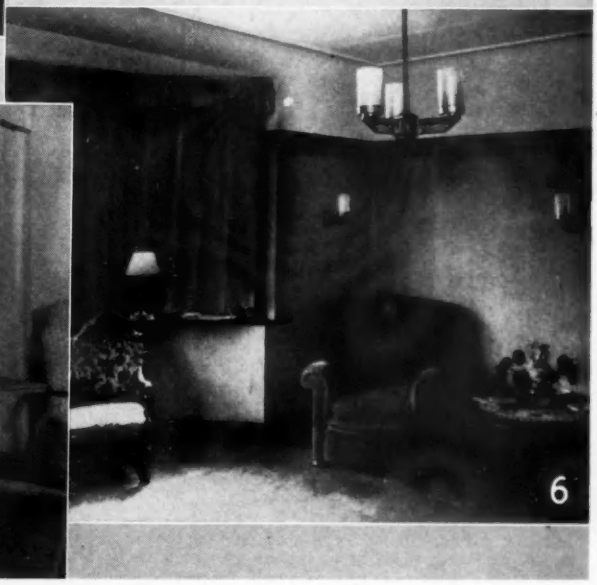
We may not easily come to the idea of complete unit kitchens, but we must agree that our friends across the water who have spent much time and money in research on the design of apparatus are well worth watching. We may confidently look forward to the day of little homes for everything in our kitchens and a space or table on which to use the electrical appliances with really convenient waist-high outlets, instead of that too-frequently known kitchen with one plug on the skirting, usually concealed behind a piece of furniture, and appliances and apparatus in various corners of the room with their flexibles and connectors wandering in from other parts of the house.

* Miss Vaughan is housecraft lecturer with the Electrical Association for Women.

EXAMPLES of DOMESTIC LIGHTING







1. The Kensington and Knightsbridge showrooms. 2, 3, and 4. Woodcock Dell Estate, Wembley Park (note the combined coal and electric fireplace). 5. Troy Court, Kensington. 6. Prout Grove, Neasden

Electric Water-heating Installations. By J. I. Bernard

A comparison of systems

Progress during the last two or three years in electric water-heating has been considerable. While the total number of installations is perhaps insufficient to exceed manufacturers' production facilities, it should be borne in mind that there is a greatly increased number of firms making apparatus of one sort or another; the total volume of business has undoubtedly risen by a large percentage.

IT was pointed out in the early days of electric water-heating that this application of electricity necessitated an unusual degree of practical installation experience. Unlike an electric cooker the performance of which will depend only upon the method of use, the satisfaction to be obtained by the user from electric water-heating depends almost entirely on the suitability of the installation for the particular house or premises concerned.

[*Swaine*

Mr. J. I. Bernard has been secretary of the E.D.A. Electric Water Heating Committee since its inception

This implies correct selection of apparatus and painstaking attention to individual conditions and requirements. The latter vary widely from a simple one-point supply for a sink to the intricacies of converting complicated fuel-fired systems in large houses. The possibility of the alternative use of a solid fuel boiler and the variation in composition of water in different districts provide additional factors which complicate the practical aspect.

From the beginning there have been two schools of thought with regard to the best type of apparatus. The first relied entirely upon the efficient automatic self-contained water-heater originally developed on the Continent. The second advocated the simple installation of an immersion heater and hand switch. Even to-day these two different ideas have not been completely reconciled, although it is becoming more generally recognised that both types have their merits in different spheres of use.

The criterion is what the user will pay. This capacity to pay should not be construed as merely the initial cash payment, and we may confidently expect everyone in receipt of an income above a bare subsistence level to be prepared to pay something more for the vastly improved service which thermostatic control affords. It is significant that where changes have been made from one type of electric water-heating to another they were from a simple immersion heater to a more complete equipment rather than *vice versa*.

The hand switch immersion heater is, in fact, the most primitive type of installation, and while its use may be expedient in households where the amount of water required, as well as the amount of money available, is small, it should not be overlooked that advertising and salesmanship can influence public opinion to demand better hot-water service.

Immersion-heater Installations

Considerable attention has been paid to the design of immersion heaters with the result that various types are now available to cater for practical conditions of vertical and horizontal fitting, greater or less fixing space and other requisites. Whenever head room permits, vertical fixing is preferable in both cylindrical and rectangular tanks because even if the element is not surrounded by a circulator tube—an arrangement which may not be satisfactory with hard water unless special precautions are taken to prevent furring—quicker recovery will be obtained. With unusually deep cylinders the extension of the circulator tube to the bottom of the tank is sufficient to ensure that the whole contents will be heated by a normal length of element.

Lagging is really essential for economical operation, whether hand or automatic control is used, and is readily carried out by an insulating jacket or by boxing up a rectangular tank and filling the intervening space—which should be at least 3 in. wide—with granulated cork.

The advisability of fitting a thermostat is a question on which it is difficult to draw a hard and fast line. In the majority of cases efficient lagging can be applied and electricity is now available at a low rate. For example, three out of every four existing consumers can obtain electricity for water-heating at ¾d. per kWh or less, so that continuous operation under thermostatic control will not involve greater cost than the ordinary householder can well afford. Exceptions may be made of households in which hot baths are required infrequently or where the family income is not sufficient to stand the cost of the radiation losses. In such cases the fitting of a thermostat does not preclude the switching off by hand during periods when the use of hot water is small.

If attention is concentrated on the poorer class of home it appears that the most economical electric water-heating installation is an immersion heater in the existing tank to be used on bath nights and wash-days plus a 1½-gallon self-contained heater fitted over the kitchen sink to provide a constant supply of hot water for daily kitchen and domestic use.

Fixing and Setting Thermostats

Where thermostats are fitted to existing tanks attention has to be paid to the position and setting. Fixing the thermostat close to the heater may result in uncertain action unless care is taken in the assembly to shield the thermostat from the water in contact with the heater. The most suitable temperature setting depends upon the position of the tank in relation to the greatest demand for water and the efficiency of the lagging. Commonly used values are between 140 and 160 deg. F.; the lowest practicable setting should be used that will meet the user's requirements. In this, as in many other points in electric water-heating, experience is always the most reliable guide.

Other practical points which arise in immersion heater installations are: first, where the cold feed pipe enters the tank in a vertical direction a T-piece or other improvised baffle should be fitted, if possible to the end of the pipe, so that the incoming cold water will not force its way upwards and cool off the old contents of the tank; secondly, where the existing hot-water pipe to the kitchen sink is teed off the flow pipe of an existing fuel-fired boiler, this connection must be fixed to the flow pipe from the hot water tap, otherwise probably only warm water will be obtained at the kitchen sink and waste of heat may occur.

Self-contained Heaters

Despite what has been said of the advantages of the immersion heater, there still remains a considerable field for the self-contained electric water-heater, the extent of which can be visualised by considering its inherent advantages. Probably the most important of these is the higher efficiency which is obtained from a factory-made job in which lagging can be carried out in the best possible way. This implies that the self-contained heater is more suitable where a constant supply of hot water is required and electricity is not available at low cost.

Another advantage of self-contained apparatus is that, as the water chamber is made of a pure metal such as nickel or is coated with tin, the hot water drawn from a heater connected direct to the main is suitable for culinary purposes. Many thousands of small heaters are used in this way as the installation, by means of a short pipe connection to a T-piece inserted behind the cold-water tap at the kitchen sink, is a simple matter and the service provided is of great value for kitchen and domestic purposes. A heater of this type may be looked upon as an electric kettle which is always nearly boiling, thus saving the busy housewife a great deal of time and labour.

Larger sizes of self-contained heaters are confined chiefly to 12, 15 and 20-gal. models for complete electrical systems in new houses and flats; in that case the cistern type is usually the most suitable, as it saves space and builders' costs and the adaptation of semi-pressure heaters to existing hot-water installations. In the latter case the water-heater is connected in series with the flow pipe from the existing hot-water tank and is preferably fixed in the kitchen so that the length of pipe to the kitchen tap, which is in most frequent use, is reduced to a minimum.

Pipe losses may, in old houses, amount to as much as the radiation losses from the tank of a self-contained heater. Whenever the total length of hot-water pipe exceeds 30 ft. consideration should be given to the use of two self-contained heaters fixed in the kitchen and bathroom. Where self-contained heaters are hired by supply undertakings it will usually be found that the hire charge for two heaters instead of one is more than sufficient to pay for the losses in pipes less than 30 ft. in length when the amount of hot water used is very considerable.

A Selection of Lighting Fittings

1. Drake & Gorham, Ltd. 2. Best & Lloyd, Ltd. 3. Falk, Stadelmann & Co., Ltd. 4. General Electric Co., Ltd. 5. Galsworthy, Ltd. 6. Dulcetto-Polyphon, Ltd. 7. Troughton & Young, Ltd. 8. William McGeoch & Co. 9. Osler & Faraday, Ltd. 10. Silas Quaker, Ltd. 11. Furn-Art, Ltd. 12. Sun Electrical Co., Ltd. 13. Ward & Goldstone, Ltd. 14. G.V.D. Illuminators. 15. Philips Lamps, Ltd. 16. Electric Art Shades (1928), Ltd. 17. Maurice Bobin. 18. Harcourts, Ltd. 19. Aladdin Industries, Ltd.

The Cooker Position. By Cincinnatus

Is development being retarded?

Of all the equipment in the home the cooker is the most important as a consumer of electricity; its market is enormous and hardly tapped, but the author considers that development is not rapid enough, and gas cookers are securing the bulk of the vast business available from new housing; electric cookers are relatively expensive. He blames design for this.

ELECTRIC cookers suffer from the early and unnecessary imitation of the appearance of the gas cooker, a far less flexible type of apparatus.

The design of an electric cooker is the design of a new instrument. The horizontal layout as used in modern American practice, with the oven by the side of the boiling plates, is a more sensible system than the old-fashioned vertical type. In very small kitchens there is something to be said for the vertical model, but the horizontal type has space underneath it for kitchen storage. This is a problem of proper kitchen layout which architects are only just beginning to think about.

Gas and electric cookers should not be compared as two exactly similar articles, but as early and more advanced forms of cooking. The heat given off by the gas cooker is felt very strongly during the summer in small kitchens, but it is often perversely regarded as useful because it will heat plates on a rack. The average housewife does not appreciate that this heat should be used in cooking.

The early practice of gas has affected the designer of electric ovens excessively. The gas oven is limited in design because it is a combustion device and must get rid of unpleasant fumes and lose heat in disposing of these by-products; the electric oven is without these defects.

A Diversity of Designs

The chief troubles seem to arise from diversity in heating practice. The mechanical design and the size of the oven do not vary widely in different makes: the sheet-metal container, slag wool insulation, enamel finish, &c., are common to practically all types. Now diversity in heating practice depends, apart from opinions, upon the type of cooking required, and this varies with the habits of people in different parts of the country and in different classes of the community.

In parts of Scotland the stew dominates the table, a habit which does not help the electric cooker salesman much. Where baking is a daily function of the housewife, experts consider that heat should come from below; where roasting is common practice, both top and bottom heating is required, or, perhaps, side and bottom heating. These difficulties affect the demands on the local supply engineer and are reflected in his specification, and it seems desirable to explore the possibility of having a flexibly heated electric oven to satisfy a variety of conditions. It would call for a design in which heating could be obtained from any one element or to combinations of elements, at top, side or bottom. This suggests increased cost at first sight, but ultimately it might be a profitable move, making an article which would be saleable in all districts.

When one considers the loading of the oven, one finds further variety. It is certainly time that supply engineers agreed on this question and made life easier for the manufacturer by standardising their demands. It is unfair to expect him to supply all varieties and keep down to minimum prices; the demand for each type is too small and prohibits profitable production. It should be possible to lay down that an oven of a certain cubic capacity, say, 1.36 cu. ft., should be equipped with a definite loading, *e.g.*, 1,400 W.

To compete with the gas-oven in speed of heating, the majority will accept the idea of fixing the elements inside the oven itself and not behind its walls. This seems important also in connection with maintenance, as it simplifies the replacement of elements.

The Hotplate Problem

When one turns to hotplates one finds a further variety of difficulties, with a choice of high-speed plates and cast-iron plates, pressed-steel plates and "Torribar"-type plates. The rapidity of heating a small volume of water to boiling point is often considered the criterion of efficiency, as though this were the sole function of the boiling plate. The high-speed plate, designed to boil rapidly, has the disadvantage of increased cost in using a step-down transformer, but the massive cast-iron plate really requires skill in efficient usage of residual heat.

Should one of these types be standardised or is a combination of types more efficient? A further point at issue now concerns heat regulation; is the three-heat switch adequate or is the correct solution to use the transformer plate with a wide regulation through tappings?

Continental and American practice discards the separate grilling chamber, partly because it is not an efficient method of using heat and partly because grilling is less common than in Britain. The question to settle seems to be whether the griller should continue in its present form or be incorporated inside the oven at the top, using this grill with the open door wide open.

To what extent can one hope for agreement on some of these basic features of cooker design among supply engineers and manufacturers? The great needs are research, standardisation where possible, and reorientation of ideas. What are the possibilities of a horizontal type of cooker, having the oven side by side with the combined hotplate and grilling section, mounted on a frame, but detachable in plugged-socket units, so that the second half can be used as a table cooker?

The cooker equipment would then consist of three units—stand, oven and combined hotplate and grill. Or can one get rid of hotplates and substitute kettle and saucepan with enclosed elements as more efficient instruments? The difficulty of deciding whether saucepans with self-contained elements are preferable to ordinary saucepans is not solely one of relative efficiency.

On this ground most people would not dispute the advantages of the self-contained variety, but would the average housewife treat such a saucepan respectfully, never letting it boil dry or immersing it in water? The great need is to meet the flexible nature and peculiarities of electricity, the requirements of dietetic science, and the needs of modern housewives and houses.

One visualises fitting cooking ovens into already prepared recesses in the walls of the future kitchen work-place, thus dispensing with costly legs, finish, &c. The designer needs to call in the architect and builder to collaborate in developments of this kind.

The Effect of Changing Diet

Some of the modern conclusions in the science of dietetics may be usefully considered. That old bogey of rapid water-boiling has been held up by the gas people as though the sole function of a cooker was to boil water for tea. Further, the boiling of vegetables in large quantities of water has always been a dreadful feature of English housewifery, wherein the unfortunate vegetable is reduced to a cellulose mass and the really vital, inorganic salts are dissolved out and thrown down the sink. This peculiarity has been criticised by biochemists, who point out that these salts are essential components of proper cellular action within the tissues, so that experts advise the use of a minimum of water for simmering the vegetables in cooking, a system termed "conservative cooking."

Again, the heavy boiled pudding of early Victorian design and construction has come under suspicion as a source of indigestion rather than of nourishment. Any definite change in the habits of housewives will influence design through changes in performance needed, and the housewife of the future will be more intelligently trained than the older generation. She will not want to drown vegetables in boiling water, but will cook them sensibly.

Wider education in the cooking art will help the electric cooker, because it requires intelligent handling to provide its maximum economies. The displacement of boiling by steaming, the economies of the multiple compartment steamer, casserole cooking, and the use of large-base saucepans in preference to small ones are features of domestic science by which the electric cooker will profit.

Possible Points of Agreement

One must not over-complicate matters. A large quantity of users are working-class housewives who lead too harassed an existence to become specialists in dietetics. With the great variety of designs on the market and storage cookers competing with normal types, the possibilities of standardising may not appear great, but many things can be done without upsetting the prejudices of the majority.

The first is to agree upon maximum dimensions for certain classes of cooker, by numbers of persons, 3, 5 or 7. This would enable builders to plan out kitchens with recesses to take these cookers. A three-bedroomed house would correspond to a certain size of cooker and the kitchen would be designed to receive it. Again, it could be agreed that oven elements should be of plug-in type, with standardised spacings and size of plugs so that repairs could be easily carried out for any cooker with damaged elements, and the supply undertaking saved from having to hold a wide and expensive stock of spare parts.

It is a good augury for the future of this type of business that, while certain new ideas in electric house-warming have achieved remarkable success recently, existing heaters are as popular as ever. The range of choice is now a wide one, and it is our aim in the following pages briefly to outline the characteristics of the chief makes, with special reference to improvements in design and construction

A DISTINCT advance has been made in the development of low-temperature heating within the past few months. The change in outlook is shown by the fact that such a large and essentially electrical firm as Siemens Electric Lamps & Supplies, Ltd., states that "the house of the future may well be heated throughout by tubular heaters and imitation-coal fires." This company now has a twelve-page catalogue devoted entirely to tubular heaters. We are quite sure that the public is gradually becoming interested in continuous heating under thermostatic control, and, looking ahead, this definitely offers a most profitable form of business for all sections of the industry.

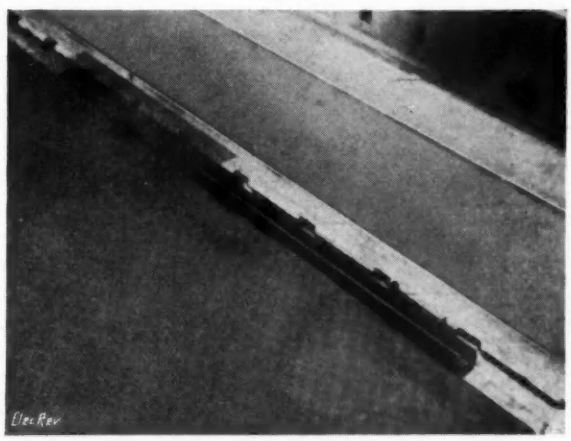
In low-temperature heating the electrical industry possesses the only scientific method of room warming. Let us take advantage of that fact. A steady ambient temperature of about 65 deg. F. is most congenial, and when we realise that this temperature can be provided uniformly we shall be on the way towards "temperature consciousness."

There is a profitable hint for the supply engineer, contractor and manufacturer in what Sun-Vic Controls, Ltd., say about this new line of thought. They refer, of course, to their recently introduced "Rototherms," and state that the provision of a reliable thermometer in every house would develop real and lasting interest in the whole subject of heating, air-conditioning, and thermostatic control, and that the benefit of this interest would react to the benefit of the whole industry.

A Unity low-temperature panel installation

Unity Heating, Ltd., remind us that, apart from reduced supply tariffs, the perfection of a cheap and reliable thermostat mainly assisted the development of tubular heating. It is interesting to learn from such an authority that the tubular heater emits 50 per cent. of its heat by radiation, and also that they do not recommend, for domestic work at any rate, continuous heating. Except for short warming-up periods, heating should be only during hours of occupation. Archibald Low & Co., Ltd., stress the importance of this form of heating because of its even distribution.

Heating tubes are usually fixed to the skirting boards, or to the floor at the foot of the wall, but the Waring Tube Heating Co., Ltd., advocates recessing the tubes below the floor level in some cases and covering them with perforated gratings. The important point, however, is that tubes provide heat where it is wanted. Messrs. Bruce Peebles & Co., Ltd., newcomers in the domestic field, find that fixing the tubes high in the room to prevent down draughts is a good scheme.



Waring tubes installed below the floor

Electroway Heaters, Ltd., make a strong point of the construction of their tubes, namely, nichrome spirals threaded through eyeletted holes in mica discs, supported on steatite clad rods. Messrs. Bertram Thomas claim that their "Tunnel" heater is particularly suitable for installation in nurseries, since the maximum temperature of exposed parts may be kept within any prescribed limit by making the casing a suitable height. The tunnel heater is not a tube, of course, but is closely allied to it in principle. For high location, the Arora Co. specialises in smaller diameter tubes with higher loadings.

Another system which is notable for its uniform distribution of heat is panel warming, which is available in several forms. Dulrae Manufacturing Co., Ltd., refers to its system, which employs a fabric with embedded wires and is designed for application to the ceiling by means of a special adhesive, as the counterpart of the hot-water ceiling panel system.

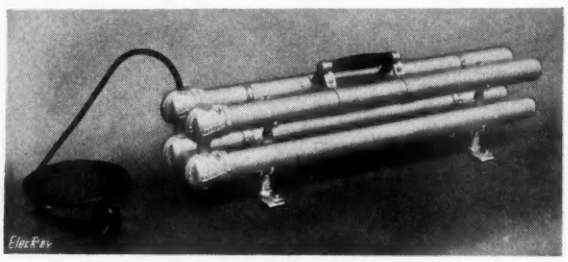
The latest move in panel warming is the "Health-Ray" system introduced by Messrs. Johnson & Phillips, Ltd. They believe that perfect warmth is produced by appreciable quantities of low-temperature radiant energy waves emanating from extensive services, and that in the "Health-Ray" system these desirable conditions are achieved by the installation of long conductors over the entire area of the ceilings. The conductors (or resistors) are mounted in special containers, and the covers are finished in the manner of the ordinary ceiling.

Unity "Electrodes" also emit the whole of their energy by radiation. They are more limited in the area covered, in that they are made in definitely sized panels, although, of course, by suitably grouping the panels almost any area could be practically entirely covered. The "Morganite" radiators marketed by the same concern hang from the wall like pictures and project heat both downwards and sideways. The Revo panel heater is similar in principle.

We cannot associate ourselves with the view that thermal storage in the home is "far fetched." After all, domestic

load, church load and industrial load are all the same at the generator terminals. The off-peak principle behind the production of Soapstone radiators has been proved sound in actual practice, and there are some very suitable models for domestic use.

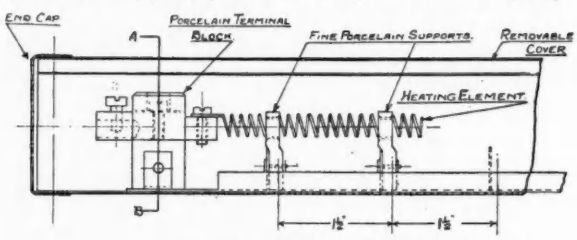
It is new to us to hear the thermal storage idea spoken of in connection with hot-water radiators, but the idea seems a good one. Messrs. Benham & Sons, Ltd., inform us that they frequently supply "Electro-Vapour" radiators half-filled with water and with low-loading. They find that the radiators (or are they convectors?) can be switched off for short periods at peak times. The continuous running suggested by the low

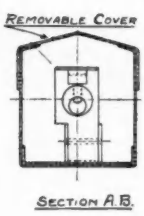


A Bruce Peebles tubular group

load must obviously be reflected in improved load factor. "Electrovex" radiators contain no water, and "Convectum" heaters have their elements arranged for three heats.

The Warmo Heating Co. has just introduced portable electric hot-water heaters as the result of inquiries arising out of its business in similar oil-heated equipment. In addition to making a point about continuous heating, it also refers to the saving in pipework, &c., when compared with the fuel-fired central heated system. Messrs. George Green & Co., Ltd., do not seem to hope for much from the domestic field for their hot-water radiation, for they deal particularly with public buildings, ships, hotels and shops. Nevertheless, they





Bertram Thomas "Tunnel" heaters

quote for special finishes to suit surrounding decorations. It cannot be over-emphasised that, while an electric hot-water radiator may look like a centrally heated radiator it need not be confined to the same uses of the latter. The industry is really serious about the "flexibility of electricity."

An air warmer marketed by the Premier Radiator & Engineering Co., Ltd., is built on the "Thermoplate" principle, and consists of corrugated plates having a number of small bore tubes passing through them from the top to the bottom headers, and a larger central tube which houses the immersion heater.

Another important means of low-temperature heating is by convection, and one surprising thing about recent developments is the large number of convectors which have appeared on the market in the last few months, many from sources outside the electrical industry, and some with loadings which seem to suggest high-temperature heating. Because of their pioneering work in electrical convection heating, we attach considerable importance to the views of Messrs. Greene, Phillips & Co. Mr. Greene calls upon makers of convectors not to revert to the position of thirty years ago when the first convector was introduced.

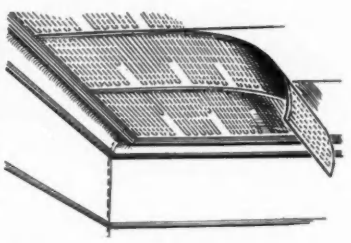
That equipment was properly condemned in view of the fairly high air discharge temperature and the resultant unhealthy room conditions. Low temperature discharge air is vital to the success of convector heating. The temperature of the elements over which the cool air is induced to flow should be so low as to avoid vitiation of any kind. The P.H. convector is designed for a discharge air temperature of about 95 deg. F. The City of London Electric Lighting Co., Ltd., has achieved such success with this equipment that low temperature heating must go forward.

There is a Unity convector self-contained with a thermostat, and Messrs. Belling & Co. have introduced one with a concealed lamp. Messrs. Rowlands Electrical Accessories, Ltd., have also marketed a small model, but they stress the advantages by way of safety in the event of the equipment getting knocked over.

The Arora air heater is designed to take the place of tubes where location difficulties are presented. Other "black heat" equipment includes the radiators built by Messrs. George Bray & Co., Ltd., for hard service, and they recommend them for such "hard to heat" places as corridors and landings where draughts are prevalent.

A point made for the "Thermo Airflow" convector produced by the Artic Fuse & Electrical Mfg. Co., Ltd., is that the warm air is projected forward into the room. The elements are embedded in conducting material and contained in a chromium steel case. The "Glow," "Flame" and "Coal Flame" fires made by this company appear to be combined radiators and convectors, as they embody air heating tubes and are said to circulate warm air at 200 ft. per minute. They are all reflector fires, and the "Flame" and "Coal Flame" units incorporate a flickering device. The latter has also a burning-coal effect.

Another equipment designed to combine the two systems of heating is the "Phantom," marketed by the Raytonic Heating Co., Ltd. It has two 1-kW reflectored elements, and inside there is a ruby lamp and a 300-W heater. The internal element keeps the casing up to low-temperature radiation heat and also provides convection, and the ruby lamp gives the appearance of intense heat by the glow through the slots in the casing. The idea is to use the internal element for basic heating and the radiant part only when the room is occupied.



Construction of "Dulrae" heating equipment

Reference to independent glow, excluding the arrangements adopted for imitation-fuel fires, brings us to recent developments by Siemens' and by Berry's Electric, Ltd. In the "Xcel Floodlit" fire a lamp set in a reflector beneath the glass panel in the base throws an upward beam of light on to the face of the fire, giving an unusually distinctive effect. Varying flood-light colours may be obtained by using glasses of different colours.

In the "Haloberry" fire a warm fire-light glow is given by a lamp concealed behind the reflector-fire proper, and between that and the semi-cylindrical reflector at the back. The separately reflectored rod-type elements are vertically disposed.

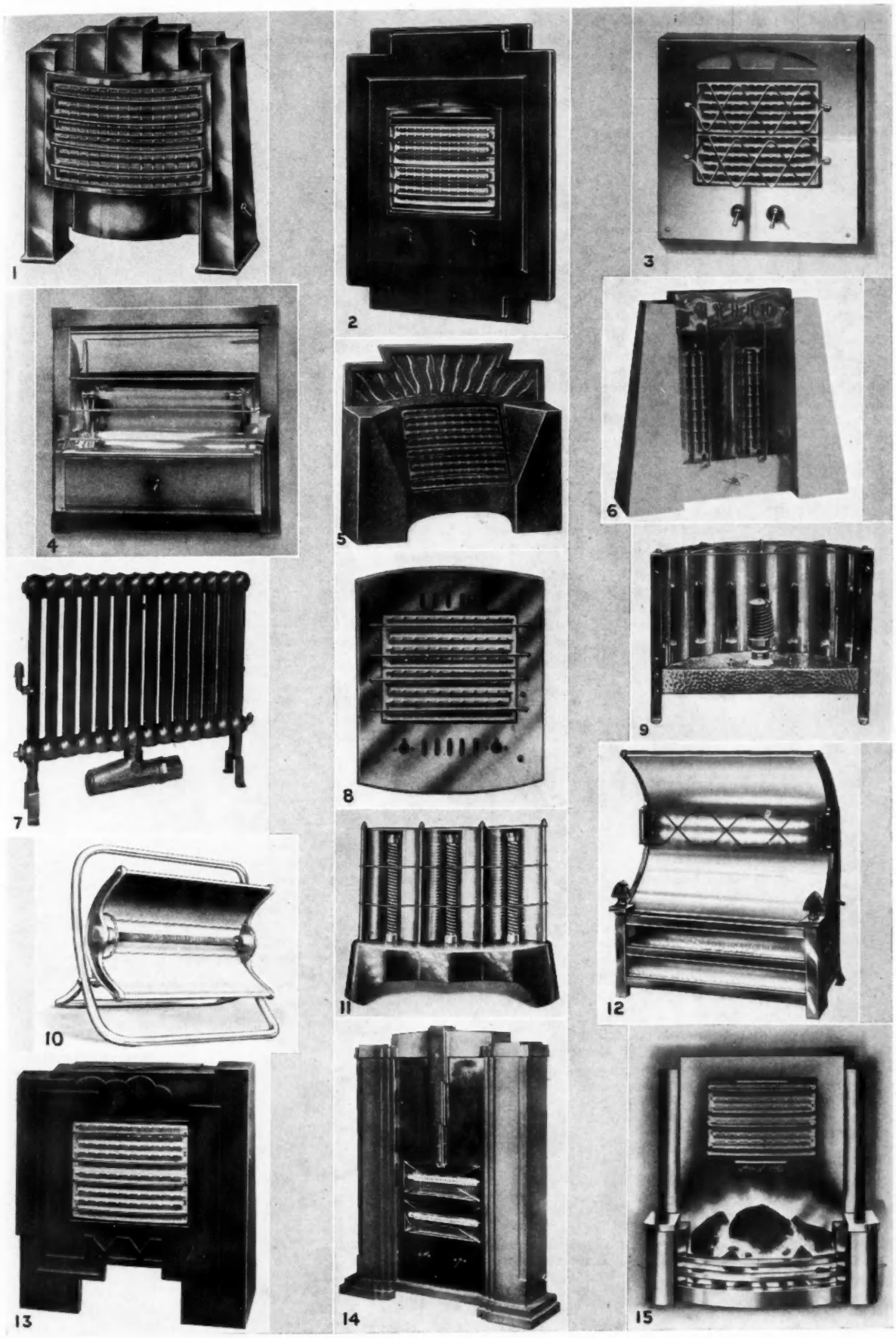
There is another type of reflector fire which, by several suitably arranged reflectors, gives the effect of the fire possessing more elements than it actually has, by virtue of its images in the reflectors. One such fire is the Arora "Welcome," which has nine vertical trough reflectors arranged as a semi-cylinder around a central vertical element. Another is the "Red Cross" produced by Messrs. Sturge & Baker, Ltd., possessing three triangular reflectors to form the two sides

A "Health-Ray" installation

1. System installed without front covers (demonstration section). 2. Installed complete (covered with perforated metal). 3. Finished papered ceiling

and top, and a triangular element unit forming the bottom interior surfaces of a side-turned pyramid. A third example is the "Nelson" produced by the Hotpoint Electric Appliance Co., Ltd. It has two vertical bar-type elements set at an angle and surrounded by reflectors.

Reflector fires built within tubular frames are in keeping with some modern furnishing ideas. Messrs. H. G. Mosely & Co., Ltd., have one with a tubular frame, a stainless-steel reflector and a rod-type element. The English Electric



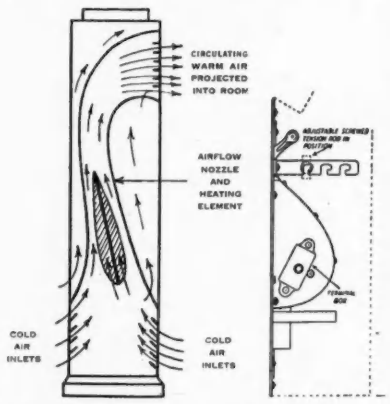
Some of the Electric Fires Mentioned in these Notes

1. The Revo "Moderna." 2. A "Magnet" inset model. 3. B. & Y. inset equipment. 4. A Ferranti builders' fire. 5. "Efesca Sunrise." 6. "Cleopatra" (Sullivan). 7. A. Benham "Electro-Vapour" unit. 8. Electroway inset fire. 9. Arora "Welcome." 10. An English Electric tubular-frame reflector design. 11. A modern reflector fire (Jackson). 12. "Floodglow" reflector unit (British National Electrics). 13. A R.E.A.L. model. 14. The Raytonic "Phantom." 15. The "Wynberry Magicoal Plus."

Co., Ltd., market a similar fire with both the reflector and the frame chromium plated. Siemens say that chromium plating has increased the popularity of reflector fires because of the efficient reflecting surface afforded.

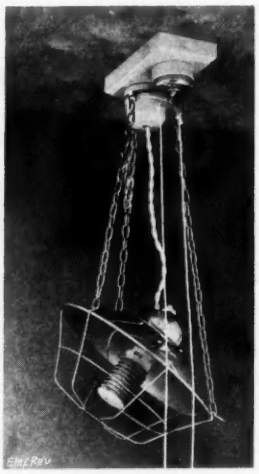
Messrs. Ferranti, Ltd., are, of course, noted for their reflector fires. Ferranti's tell us that there has been no change in the fundamental principle of their fire since its first appearance in 1927. It was designed to afford the highest possible efficiency of radiation. The "Primera," one of the earliest models, is still sold in large numbers, and the "Glowera" is a favourite, no doubt because of the cheerful glow independent of the fire proper. Built-in fires, they say, are becoming more and more popular, and the public are now recognising that the flush setting is the proper fixing for permanent heating equipment. They refer also to the large sale of low-loaded fires.

We are reminded of the support which Ferranti's give to the scheme which provides both high-temperature and low-temperature heating. The Ferranti fire is designed to flood the whole of the lower part of a room, and the idea is that this radiant flooding should be on only when the room is occupied, and should supplement basic heat from any other system which may be employed.



Arrangements of the "Thermo-Airflow" and simple inset hanging (Hotpoint)

Reflector fires with separately reflectored vertical rod-type elements are associated with the Jackson Electric Stove Co., Ltd., but absence of a framework around the elements in a new model, No. 773, strikes a fresh note. Chromium-plated reflectors and rod-type elements are also featured in a new range of fires introduced by the General Electric Co., Ltd. The elements plug in, and the company stresses the importance, not only of good contact when the fire is new, but also of the need for the contacts to retain their resiliency throughout the life of the fire. The contacts are made from "Staybrite." A "U" shaped slot is embodied in the contacts into which the elements fit, while a collar in the end-cap prevents the rod falling out of position as the result of misuse or breakage. Carron Company's reflector-type fires with plug-in elements have solid pins and split sockets. It is easier to cool the socket than the pin.



The "Reydome"

Although Rowlands admit the present demand for the reflector fire they do not agree that it is the equipment of the future, and talk of public prejudice because of the intensely localised beam of heat. They market one model. There is the type of reflector fire in which the heat is only partially reflectored, and in which the reflector is relied on more for effect. This type of fire usually takes the form of one with a high-back reflector, the elements being disposed at its base. The "Countess" produced by Premier Electric Heaters, Ltd., is still very popular; on account of its versatile design it is adaptable to any period of furnishing or decoration.

The same construction is employed for the "Langbank" and the "Floodglow" fires of British National Electrics, Ltd., but the former has elements welled at the base of the reflector, while the latter has rod-type elements actually focused within its reflector. There is a second reflector behind the bars at the base of the "Floodglow," presumably for the glow.

"Made to measure" is the suggestion behind the production of tiled mantel fires (Messrs. Girlings, Ltd.). They are suitable for standing in the hearth and are made with frames to match existing tiles.

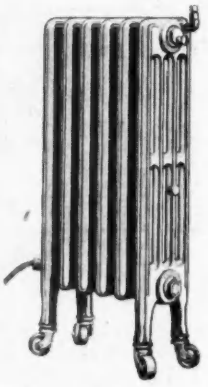
A Belling convector (left), Soapstone thermal storage in the home (centre) and Bray black-heat radiator

One of the lowest loaded reflector fires we have seen is that sold by Messrs. McLeod & McLeod, Ltd. It has a copper reflector and a 500-W plug-in rod-type element.

The bowl fire has most right to the name "reflector," and Rowlands assure us that the belief in certain quarters that the sale of this popular equipment is dying is quite unfounded. In modified form the bowl fire is particularly useful for bathroom service.

The "Reydome," produced by Messrs. A. Reyrolle & Co., Ltd., is designed expressly for this purpose, and is supplied as an outfit complete with suspension chains, ceiling switch and cords. It is adjustable so that heat can be projected in any direction.

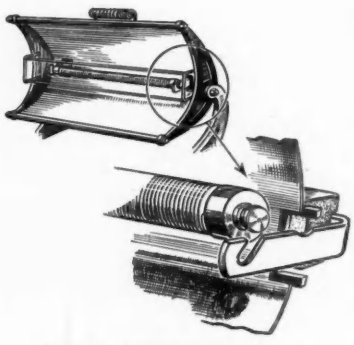
The only high-temperature Unity equipment which we can call to mind is the new "Sunglow." It has a suspended bowl of special material, in which is placed, making a close fit with its bright side down, a special element unit. The bowl glows very cheerfully.



A Warmo water heater

It may not be generally appreciated that the "Sun-ray Tricity" combined heating and decorative illumination units marketed by Messrs. L. G. Hawkins & Co., Ltd., embody one of the oldest forms of radiant heating, namely, the "sausage" lamp. Supplementary heating is now provided in some models by reflectored rod-type elements, vertically or horizontally disposed.

Imitation-fuel fires are more realistic than ever, and judging from the catalogue of Berry's Electric there is still a demand for the expensive types of fires, costing upwards of £40. The "Cotswold," an imitation-fuel fire sold by Simplex Electric, Ltd., is claimed to be the only fire with a complete half-circle of heat. Elements are carried in the semi-circular fire bars, and it is claimed that people at each side receive as much warmth as those in the centre.



Plug-in arrangements on a "Magnet" reflector fire

Siemens believe that their H7321 model is the only fire with a rounded back. It is suitable for use in modern tiled fireplaces. The new Premier "Grafton" is of unusual construction in that its horizontal bar element is at the top, while the reflector is at the back of the fuel and is full of "dancing firelight" when illuminated.

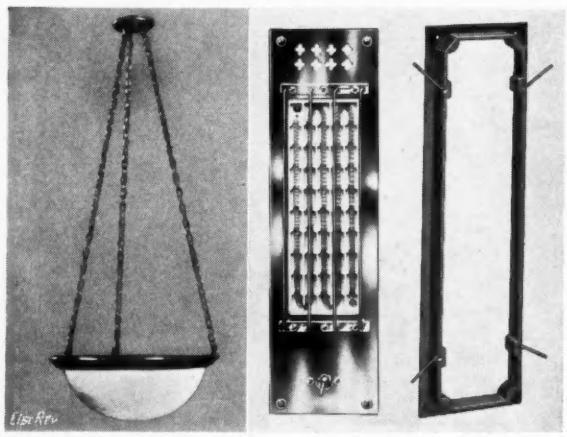
The imitation-fuel fire with reflectored elements has made rapid progress in recent months. A typical example is the Belling "Carlton." It has two vertical separately troughed

Further Examples of Modern Electric Fires

1. The Hart "Mayfair." 2. Bell summer firescreen with panel fire. 3. A "Vesper" screen (Sturge & Baker). 4. "Kingswood" inset fire (Veritys). 5. Hotpoint "Nelson." 6. "Made to Measure" mantel fire (Girlings). 7. The Homefyre "Tower." 8. The "Countess" (Premier). 9. A Simplex "Cotswold," which provides a complete half-circle of heat. 10. A "Sunray Tricity." 11. "Doelcam" reflector fire. 12. The "Sirius" (Carron). 13. A low-priced cast-iron fire (Wholesale Fittings). 14. The "Xcel Floodlit." 15. A Brown Bros. radiator

elements at the back fitted into a simple but dignified setting.

The outstanding development of recent times as regards high-temperature fires is the inset apparatus, and this is largely due to electrical people having convinced the builders of housing estates that a saving in building costs can be effected by their installation. These fires are often fixed to coke breeze walls, and some sort of reflector protection at the



A Unity "Sunglow" (left) and an illustration showing the strong Acelite frame

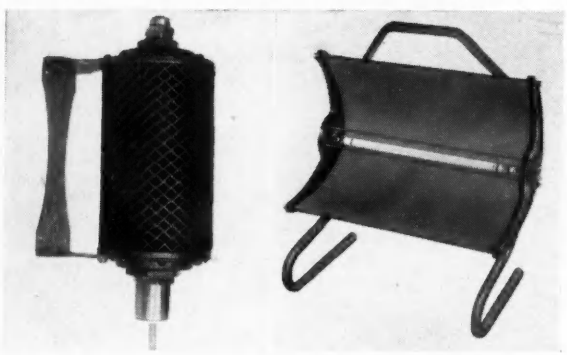
back of the element is usual, as in the G.E.C. inset fires.

The arrangement adopted for the "Bon" fire produced by the Hart Foundry Co. depicts the special ventilation arrangements for that type of fire made by them. The hot air rises but is deflected forward by a louvre. Cool air passes in through the ventilation holes at the bottom and circulates round the louvre and cast-iron frame, so preventing any accumulation of hot air. A cool air circulation is also arranged between the fire and the wall to prevent overheating.

Of the new Simplex Electric inset fires, No. H963 is specially designed to occupy the space of three 4-in. tiles. The Hotpoint "Nelson" referred to is very similar to the "Nonpareil" of the same make. This is an inset fire, but by a back stay support it is easily convertible to a portable unit.

Carron Company's new inset fire (No. 501) can be supplied with the elements either vertical or horizontal.

A portable inset which can be made to fit any fireplace is sold by Electroway Heaters, Ltd., and an attractive feature of the inset equipment marketed by Messrs. Edward Allen &



Premier radiator hot-water air warmer (left) and a Dowsing reflector fire

Sons are the vertically disposed elements. Acelite, Ltd., make a point of the strong iron frame for its insets, while in the "Kingswood" made by Veritys, Ltd., vents at the top and bottom and the enclosed back provide for convection.

Ensuring back air circulation is also the method adopted by Messrs. Berkeley & Young, Ltd., to prevent accumulation of heat behind the fire. This company regards it as important that the consumer should be able to adjust the angle of the fire bar, and it embodies this feature in some popular models, as the "Pivotte," "Pedestal" and "Swivel."

The "Tilting Merrifire," of Homefyre, Ltd., also has adjustable heat direction. It is semi-cylindrical in construction and has a central bowl-fire type of element. The No. 148 Moseley is another adjustable unit, with its circular dome-like body within simple easel legs. Similarly, the new "Sunflex" and "Rayflecta" Berry fires can be adjusted for direction of radiation. They have rod-type elements in separate reflectors.

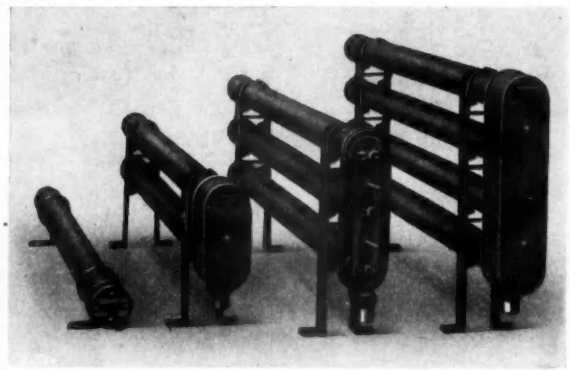
There are some attractive combined coal and electric fires on the market, including those marketed by Messrs. A. Bell & Co., Ltd., and Messrs. W. N. Froy & Sons, Ltd. The Bell solely electrical equipment includes a tile summer firescreen complete with a panel reflector fire, and an attractive panel fire with simple hook-on arrangements. The Froy adaptable fire is specially designed to take the place of a coal fire in arched tiled surrounds. By a slotted base it can be adjusted to suit any fire opening from 22 in. to 25 in. high.

With regard to modern design, the Revo Electric Co. notes that the severe simplicity of these new styles harmonise well with almost all present-day decorative schemes. The "Moderna" is a good example, and mention should be made of the "Efesca Sunrise" fire and the "Cleopatra" of Messrs. H. W. Sullivan, Ltd.

Alneco, Ltd., are newcomers into the electrical domestic field. With the exception of a reflector fire, their models incorporate the heavy "pillar" construction. The Acelite "Monarch" is also massive, but in this case the severity of straight lines is lessened by the finish of the metal surround.

The bar fire is still most popular, according to Siemens. The element is both mechanically and electrically strong, and it can be simply fitted in a light cast or pressed frame. The "Tunbridge" is an example of the results of the company's efforts to combine the advantage of the cast case and the portability of the pressed fire.

Siemens say the demand for low-priced fires has almost resulted in the elimination of electro finishes and sheet brass, and the adoption of spray finishes instead. Electroway Heaters attribute the low cost of sheet-metal portable fires to the easy construction permitted by resistance welding.

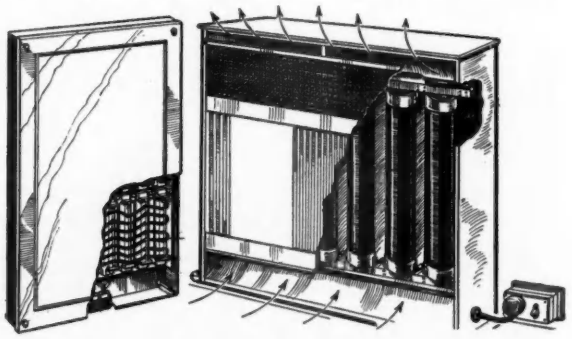


"Highlow" tube banks

A good example of such sheet-metal fire is one sold by Elcap, Ltd., at 7s. 6d. It has a bar element (750 W) and a c.p. reflector. The Wholesale Fittings Co., Ltd., has introduced a new 2,000-W cast fire with a carrying handle for 23s. Ten new fires introduced by British National Electrics range from the "Stockwell" sheet-metal radiator at 8s. 6d. to the "Flood glow" at £3 10s.

The new "Sirius" fire introduced by Carron Company is built on the same lines as the "Argus," but it is finished in vitreous enamel instead of porcelain. The "Star" sheet-metal fires are produced in both bar and reflector types, but the "Sirius" is made only in the bar form.

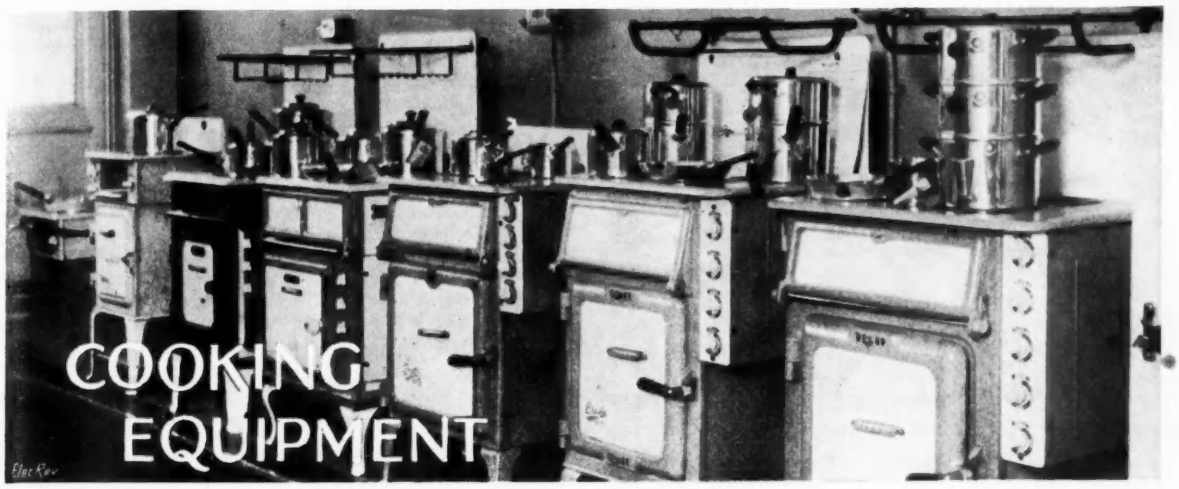
The only outstanding change in element design is the "Superposed" design adopted by Rowlands. The spiral coils are set to one side so that they overlap and present to the front a greater radiating surface. Falk, Stadelmann are



The construction of a Revo panel heater (left) and that of a P.H. convector

also adopting this type of element. A few bar elements differ from orthodox practice in some respects. The "Allenson Bean" bar employed by Messrs. Edward Allen & Sons is claimed to give an increased circle of radiation.

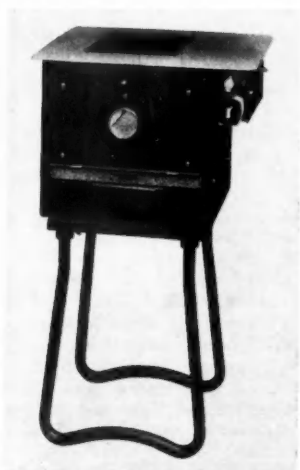
The photograph reproduced at the head of this article was taken in the showrooms of the Westminster Electric Supply Corporation, Ltd.



COOKING EQUIPMENT

It is intended in this article to indicate generally the lines along which manufacturers are proceeding in the campaign to extend the use of electrical cooking equipment, and elaborate technical details have been purposely avoided. The information given shows that appliances have been improved in many ways, and there are at least one or two noteworthy departures from orthodox design

LESS attention to price cutting in cooker sales and more to the development of electric cooking service would be good for both supply undertakings and manufacturers, for the field of development is immense. Price reduction compatible with good business, however, is to the benefit of all.



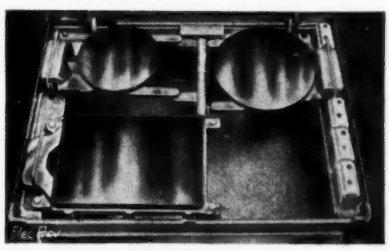
The No. 5 "Nippy"

Messrs. Berkeley & Young, Ltd., in connection with their new No. 5 "Nippy" cooker, question whether it is necessary for electric cookers to appear like gas cookers. This equipment is of light construction and has a lagged oven with top and bottom heat, the top heat from an 1,800-W griller-boiler and the bottom heat from a 400-W element which can also serve the hot cupboard under the oven.

A kettle socket and a heat indicator are included, and complete with a stand the cooker costs £4 7s. 6d.

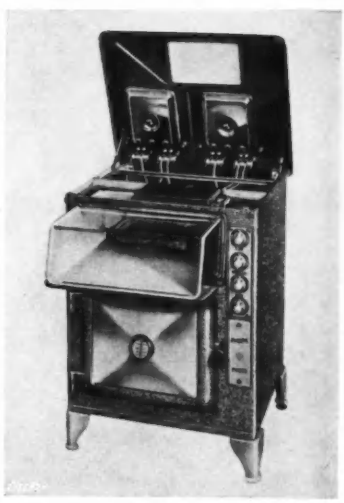
With or without reference to gas equipment, the modern cooker generally is good-looking, with finish of considerable utility value, and, as the Revo Electric Co., Ltd., says with reference to its own cookers, the unstainable, non-chipping, non-cracking, lustrous surface of the mottled grey enamel has brought ease to the kitchen. Notable exceptions to mottled grey finish are the colonial type cookers which have recently appeared on the English market. Excellent examples are the three-coat acid-resisting and fadeless porcelain enamels used by Eaton Canadian Products (England), Ltd., and similar finishes by Moffats, Ltd.

The present-day tendency towards simplicity of dismantling the hob equipment has also facilitated kitchen work. Supply men will certainly associate the Jackson Electric Stove Co., Ltd., with this idea, but other more recent examples of "hob dismantling" without tools are to be found in "Xcel" and Revo apparatus. The latest move towards hob simplicity is fixing the plate cradles to the hob, so that the heating units lift with it. There are good examples of this in the new No. 10 Revo, in the cookers of Hotpoint Electric Appliance Co., Ltd., fitted with "Torribar" units, and in the table cooker recently introduced by Carron Company.



Simple housing of hob equipment on the Revo cooker

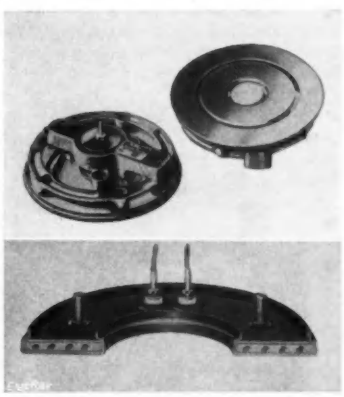
Tubular sheathed elements are one example of the many "glowing" type units on the market, which have resulted in controversy as to whether lightly constructed but protected plates or the embedded-element heavy solid plate is the better. We are pleased that it is not war to the bitter end as with the old "open" and solid plates, for in many cases the type of plate is optional.



"Torribar" boiling plates lift up with the hob on Hotpoint cookers

The Metropolitan-Vickers Electrical Co., Ltd., states with reference to its tubular sheathed element plates, that the small mass around the element proper permits high speed, and that for the same reason and the fact that the utensil stands directly on the red-hot sheath, with consequent high conduction and radiation, this type of element is more efficient.

Much the same thing is said by George Bray & Co., Ltd., who stress the small loss by residual heat in connection with "Chromalox" plates, while Hotpoint emphasise that there is no need to use special cooking utensils with the "Torribar." It is pleasing to note that the misnomer "open" type is no longer applied to these "radiant" plates.



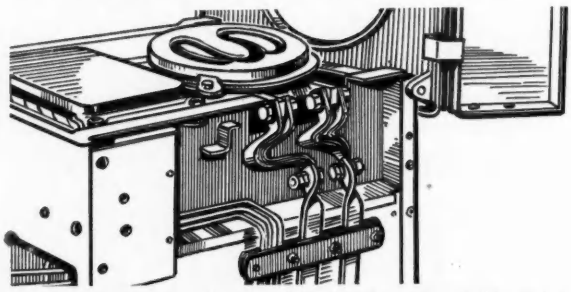
Construction of a "Chromalox" hot-plate

The Falkirk Iron Co., Ltd., has changed over to these plates for reasons similar to those given, and we were told that they appear to be quite satisfactory as regards "life." Another large cooker manufacturing company felt that although the "radiant" tube sheathed element plates would heat small quantities of water more quickly the time saved was not so important with larger quantities, and because of the extra cost many supply undertakings would not consider using these plates.

Carron Company informed us a few weeks ago that it was negotiating for the use of the Met.-Vick griller-boiler, as well

as the boiling plates. The company referred to a balance between the solid and the glowing plate. We wonder what decides such a balance.

The low-voltage plates such as the "Superspeed" and the "Lightning" plate of Simplex Electric Co., Ltd., are, however, definitely open plates, and the points stressed for the light-construction plates must apply more to these equipments.



Construction of the Simplex lightning l.v. open boiling plate

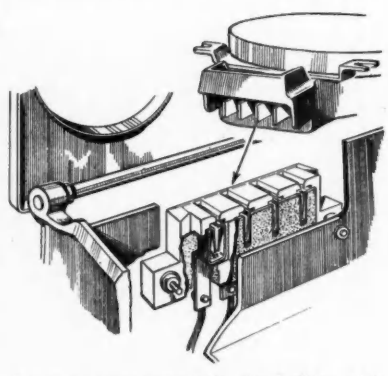
The latest Falkirk cooker

Revo claims that consumers definitely appreciate the extra speed of the "Superspeed," while Simplex refer to the popularity attained by their more recently introduced apparatus which has practically no time lag, and its 10-V operation ensures safety.

The extra cost of the low-voltage open plate presents a problem not only to users and supply men. In addition, one company wishes to know whether the maintenance of this type of plate is sufficiently low to warrant the increased extra cost. It contends that from the user's point of view the existing boiling plate (presumably the solid type) is slow, and it would, no doubt, agree that advantage to the consumer by way of quick boiling should also be set against the extra cost.

The solid plate, however, has many enthusiasts, and much progress has been made in its construction. The General Electric Co., Ltd., tell us that the 8-in. plate, originally loaded at 1,600 W, is now loaded at 2,250 W, and that it will boil two pints of water in just over six minutes in an ordinary commercial copper-bottomed kettle. They also say that the higher loaded plate gives a promise of even longer life.

Most makers and advocates of the solid plate, we believe, at least advise the use of special utensils, particularly those designed on scientific lines, such as the "Pyramid" appliances produced by Messrs. Hague & McKenzie, Ltd. Belling & Co., Ltd., make a strong point that it is more economical to use utensils with flat bottoms.



Plug-in arrangements for the boiling plate of a Belling cooker

Heating troubles with plug-in connections seem to have been solved in various ways, two good examples of which are the heavy knife-switch connection employed by Messrs. Belling & Co., and the use of two dissimilar metals to prevent corrosion used by Siemens Electric Lamps & Supplies, Ltd.

The desire is frequently voiced for more heating equipment on the hob, and in this connection it is of interest to refer to the new cooker produced for hiring by the Croydon electricity undertaking. It has two 1,150-W and one 2-kW hot plates, in addition to a separate grill, within a space 27 in. by 18 in.

The idea of keeping grilling quite separate from boiling is favoured by some manufacturers—Eaton Canadian for one. Certainly the combined unit cannot be as efficient when used for one operation only.

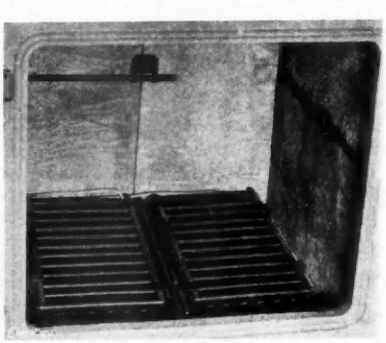
The view expressed by Edmundson's Electricity Supply Corporation, Ltd., that the electric oven should be regarded merely as a lagged box to which electrical equipment could be fitted seems to be supported by the G.E.C., who make the point, in connection with the removable oven interior, that it is entirely non-electric, and that there is no need for the housewife to remove electrical components. They say that the inner shell acts as a heat distributor, but the same argument must apply to the fixed oven interior where the elements are outside the oven interior, such as in the older models of British National Electrics, Ltd., and the new Belling cookers, as well as, partially, in equipment produced by the English Electric Co., Ltd.

Constructional view of an English Electric cooker

It is said that this "exterior element" idea saves cooking space, a claim also made in connection with Eaton Canadian equipment, by virtue of the elements being recessed below the inner shell surface. The special flat sheathed connectors, located away from the heat of the oven so as to eliminate the possibility of arcing, are an important feature of these cookers. With regard to interchangeability, the makers say that the removable oven interior helps in this way, as it permits the use of multiple-panel elements of consistent and uniform wattage.

Stone-slab Heat Insulation

In the new Croydon (Shirley) cooker we saw a further development of the moulded slab oven heat-insulation scheme. Cellular-stone slabs are employed, permitting increased cooking space as the slabs are thinner and do not need inner support. It is rumoured that this form of insulation will be seen in the cookers to be introduced by the new Tricity Company.



Slab stone oven insulation in a Shirley cooker

Provision for holding the oven shelves sometimes has a bearing on the cooking space, and many methods are employed, varying generally according to the main oven construction. Largely for the removable oven there is the fixed runner seen in "Magnet" cookers, then for fixed oven interiors there are the skeleton side hangers stressed by Siemens.

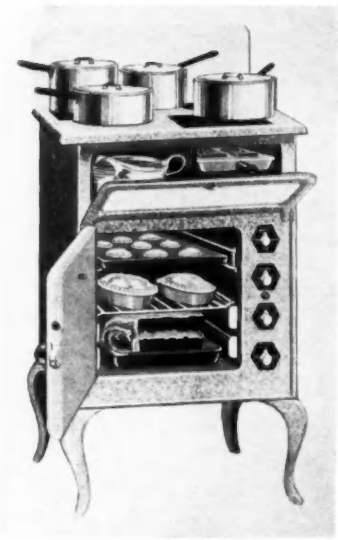
Good examples of support by the actual element bars may be seen in Jackson cabinets, and the plate type element guard and runner rack is illustrated in the hinged guard employed in the cookers of the English Electric Co., Ltd. There is also Revo's "corrugated" oven interior in which the rack sliders are pressed in the oven sides.

The oven ventilation problem appears to be still a little unsettled, and the boldest move we have seen is on the new "Servis" cookers. A really large opening has a door controllable by the cook.

Automatic oven-temperature control is still a young idea. We are pleased to see it, for the electrical industry so assuredly

holds the reins of automatic control in any direction. The latest development we have seen in this way is on the "Shirley" cooker, employing a specially designed thermostat made by the Rheostatic Co., Ltd. Others, including Revo and Hotpoint, employ apparatus produced by the Igranic Co., Ltd. A switching development (not automatic) of much interest is that on the "Servis" cookers. Low heat is provided by one-sixth of full loading. On the other hand, for continuous automatic control it has been claimed that higher loading at low heat is permitted by the absence of series-parallel control.

It is becoming more or less commonplace to embody the cooker switches within the main structure of the cooker, and, as the Falkirk Iron Co. points out, this affords more hot-cupboard space. We are prompted to point to the Jackson "cooking cabinets" as good examples. Nevertheless, incorporating the main cooker switch in the cooker itself is not yet an established practice, and most of the examples we have seen have been optional.



Incorporated switches in the Jackson 94J

A kettle plug on the cooker body, however, is much more popular. The new cooker produced by Messrs. Walker Hunter & Co., Ltd., has both the main cooker switch and switch-fuse and plug equipment for a kettle incorporated. In addition to the main 35-A d.p. main Santon switch there are, alternatively, one 15-A d.p. main switch and d.p. fuse for the plug, or a three-pin interlocking d.p. switch-plug and d.p. fuses. We have also seen an "Xcel" cooker similarly equipped.

Accessibility of wiring and fuses is, of course, all important, and most manufacturers now pay particular attention to this. A notable example is found on Hotpoint cookers. Here the fuses are in front of the cooker behind a plate on which there is an indication of the circuit controlled by each fuse.

The Breakfast Cooker

There is a tendency, sometimes coupled with that for the separate grilling unit, to fit doors to even the smaller cooker hot cupboards. Apart from table or breakfast cookers, the "Carronian" is the smallest cooker of orthodox design that we know of with this feature. The grill chamber measures 5⅜ in. by 11 in. by 12 in., and the overall dimensions are 31 in. by 16¼ in. by 14 in.

It is difficult now to dissociate the breakfast cooker from the larger equipments. Some of the small cookers with only a griller-boiler as hob equipment are really breakfast cookers with the conventional mounting of the large cookers.

One of the most interesting breakfast cooker developments is the new B2 Carron which is of all cast-iron construction. The grill unit can be released by a single screw at the side of the cooker and withdrawn from the front. The ease of replacing components is a point of appeal to the supply undertaking.

The new English Electric breakfast cooker has a radiant plate of light construction with inverted channels over the resistors, from side to side like bars. When "on" a bright glow from the reflector below is seen between the bars. The breakfast cooker of Messrs Edward Allen and Sons, Ltd., is loaded at 2,200 W, but with a separate grill and boiling plate. Twelve shillings and sixpence is about the lowest price we have seen for a breakfast cooker complete with an "oven" and door, this being the cost of the "Regal" made by Messrs. C. Hounslow & Co., which appears to have an open or semi-protected hot-plate and grill.

An excellent example of simple cooker wiring for Falk, Stadelmann

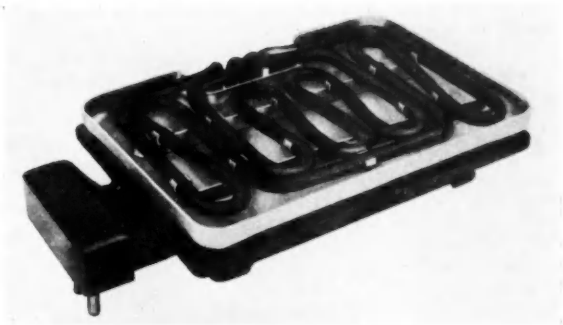
We had not seen a table-type cooker with continuous automatic control before inspecting the Kubex oven and griller (Kubex, Ltd.). There is also a grilling chamber separate from the oven. The separate oven and boiling plate of the Arora Co. can be arranged as a complete outfit, either as horizontal cooker with a table or as a vertical cooker with a shelved stand.

One of the new "Magnet" storage cookers

The G.E.C. have increasing faith in the storage cooker, and are anxious to correct an impression that the use of such equipment involves a change in orthodox cooking methods. They have introduced two new models with a storage load reduction from 500 W to 450 W, with, they claim, even better performance.

A Semi-storage Cooker

In a semi-storage model all the hob operations are catered for by the large storage block, while a change-over switch



A Met-Vick boiling plate

serves the normal oven element and also a higher loaded griller. The total load of the cooker is 1,950 W, as against the 8 kW of an ordinary cooker of the same capacity. The company points out that, as the electric oven has a higher diversity factor than hob equipment, the semi-storage cooker contributes even proportionately less to maximum demand than the ordinary cooker. We are pleased to see the advantages by way of peak reduction stressed also for urban areas, for we have always felt that this consideration is more important for urban than for rural districts.

Another unusual type of cooker is the waterless equipment which exists in a few forms, usually for steam pressure operation—self contained electrically and otherwise. A recent development of such equipment is that introduced by the British Development Co., for which is claimed a uniform temperature all round the food, irrespective of the position it occupies in the cooker, by virtue of the scientific application of the heat.

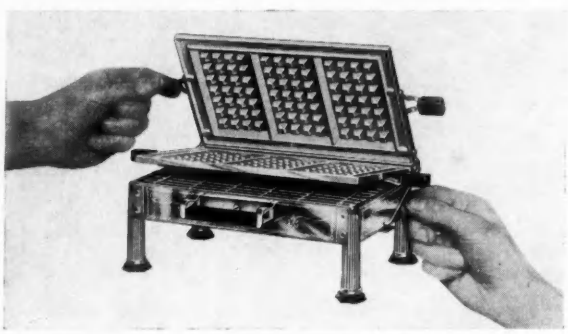
The Carronian; note the grill chamber door

A housewife's view is that the popularity of the dinner wagon ensures success for the electric service trolley. Keeping a course of a meal warm near at hand during the consumption of the previous one is a help in the labour problem.

The trolley manufactured by Messrs. Bertram Thomas is about the size of the familiar dinner wagon and may be used as such. It is supplied with a hot-plate top and a shelf beneath, or with a hot-plate top and a hot cupboard beneath, or with the hot cupboard and a lift-out tray at the top. The hot-plate forms a convenient carving table. A single plug and socket serves for the main supply and auxiliary outlets are available for table appliances. A useful service trolley with plug connections for appliances only is that produced by Messrs. A. Reyrolle & Co., Ltd.

Waffle cooking is at present more common in the restaurant than in the home, but it might easily be developed to contribute considerably to the domestic load. Scotoid, Ltd., sells a waffle cooker at 25s., which will produce 4-in. waffles at the rate of three or four per minute, after heating up.

The waffle heater introduced by Messrs. W. T. Henley Telegraph Works Co., Ltd., we believe, has already attained considerable popularity. The combination toaster and waffle heater marketed by the Cooper Stewart Engineering Co.,

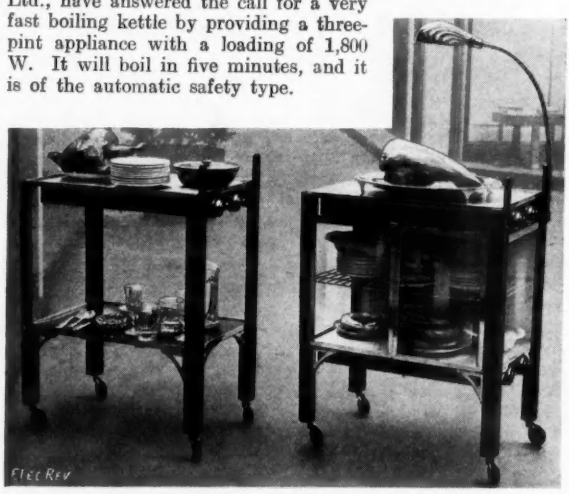


A Cooper Stewart combined waffle-iron and toaster

Ltd., should make an economy appeal as the combination is effected by a waffle-iron attachment fitted to the company's flat toaster for which they claim success on the score of rising heat, the toast being located immediately above the horizontal element.

Table Cooking Appliances

With regard to table appliances such as kettles, toasters, &c., it is probable that Revo's reference to its own products, namely, that the present tendency is towards improving speed of operation and reliability rather than to changing appearances, applies to most companies. Messrs. Bulpitt & Sons, Ltd., have answered the call for a very fast boiling kettle by providing a three-pint appliance with a loading of 1,800 W. It will boil in five minutes, and it is of the automatic safety type.



The Bertram Thomas service trolleys

The "Quickset" kettle introduced by Premier Electric Heaters, Ltd., represents a definite advance in accident-proof kettle development. It can be reset simply by pushing back the plunger. There is very wide diversity in kettle loadings: for instance, Alneco, Ltd., has two-, three- and four-pint kettles all loaded at 750 W, and Homefyre, Ltd., has a two-pint kettle loaded at 650 W and a three-pint size loaded at 900 W. Elcap, Ltd., stresses that its kettles are approximately the same thickness of metal throughout and not spun to look like very thick metal.

There is apparently still a call for the combined cooker and heater, and a good example of the many low-priced equipments now available is the Cam-Heat produced by the East London Rubber Co., Ltd., which costs 8s. 6d. and is loaded at 500 W.

An interesting example of the numerous warming plates available is the "Jaco," sold by Jackson Boilers, Ltd., measuring 18 in. by 12 in., it has a total load of 200 W. "Red

Above: The new English Electric breakfast cooker. Below: An inexpensive boiling ring made by Brown Bros. (right), and a "Cam-Heat" utility heater

Rose" boiling rings, produced by Messrs. Sturge & Baker, Ltd., are of "upturned bowl-fire" construction. The inverted-cooking principle "Stokes" table cooker produced by the London Aluminium Co., Ltd., has been well received for light table cooking in bachelor flats.

We refer to publicity last, but by no means because it is of least importance. Indeed, it is quite often the way the story is told that influences most a manufacturer's prosperity. Many makers are alive now to the need for stressing the utility side of the cooker, and mere technical details alone do not mean so much at this stage of development. A few of the special propaganda points of appeal which we have selected show that many manufacturers are alive to the importance of this question.

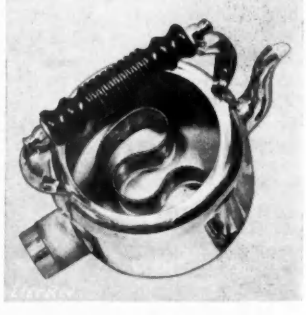
Referring to oven heating-up time, Siemens say that, in regard to this initial heating period, instructions sent out with gas cookers demand lighting up 20 min. before use, a point not often realised by many who criticise the initial heating-up period of an electric cooker.

In their attractive handbook, "The New Way of Cooking," Belling's tell in an easily understandable way how to use boiling plates: "It is more economical to use utensils with flat bottoms . . . in the case of milk boiling use a large saucepan entirely covering the boiling plate, no matter how small the quantity of milk . . . in the case of egg boiling also use a large saucepan with just sufficient water to cover the bottom."

Jackson's show how economies can be practised in summer months by cooking the lighter meals required on the grill and grill boiling plate only. For example, a meal for six to eight persons was prepared solely on this hob equipment, the consumption being 0.75 kWh. The food cooked comprised 2 lb. steak, 1 lb. tomatoes, 2 lb. mashed potatoes, a cabinet pudding and jam sauce.

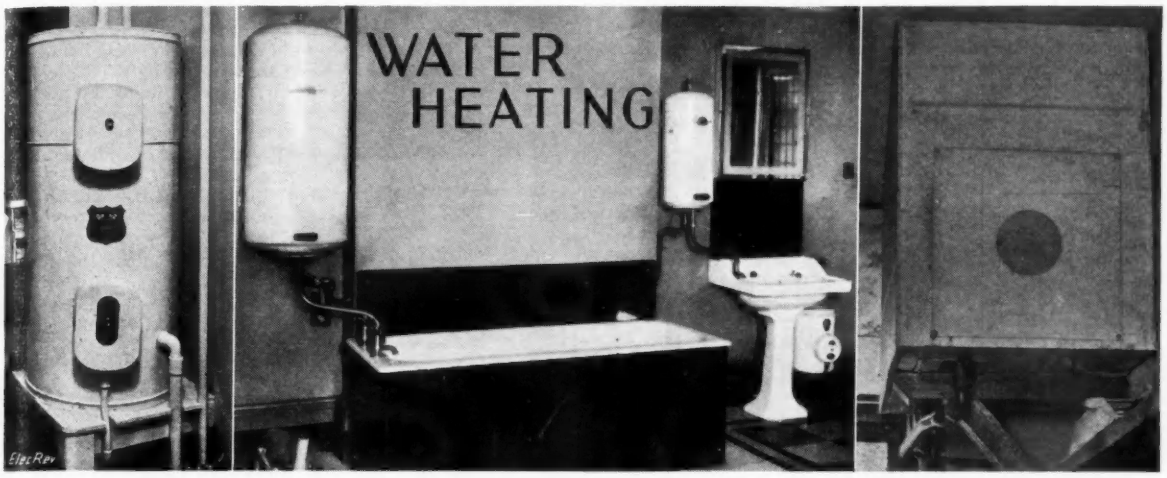
Falk, Stadelmann point out that the high loading of the "Servis" griller-boiler enables the housewife to cook a complete meal on that unit only.

In referring to the oven capacity of its cookers, English Electric gives examples of the food that can be cooked in the oven at one time; two of these examples are: 4 lb. of meat, 2 lb. of potatoes; and one large pie, or as an alternative four 1½-lb. loaves.



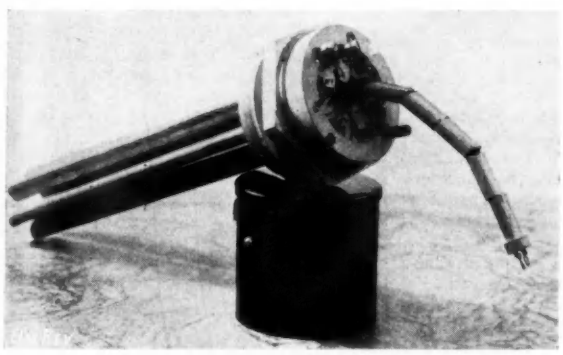
The Bulpitt quick-boiling kettle

The picture at the head of this article was reproduced from a photograph taken at the showrooms of the Kensington and Knightsbridge Electric Lighting Co., Ltd.



It is apparent that among the many manufacturers of electric water-heating equipment there are many views which have become crystallised in their individual products. The following notes give expression to some ideas gathered from interviews with manufacturers and describe typical examples of their practical application.

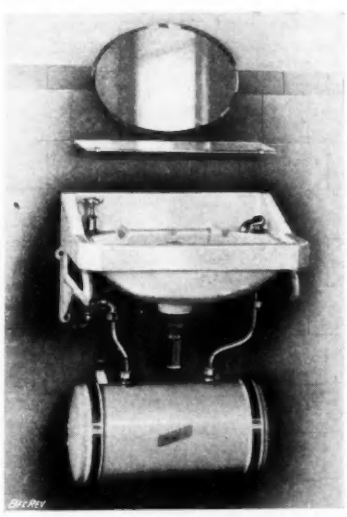
WE are reminded by Revo Electric Co., Ltd., that only a very small proportion of electricity consumers in this country use electricity for water heating. They suggest that very few realise what an inexpensive service it is with modern equipment, and we commend their slogan, " no stoking, no waiting " to all.



Construction of Ferranti immerser showing flexible element

Regarding cost, Thermics, Ltd., make a very interesting electricity and fuel comparison. A 25-gal. Thermic water heater costs £7 10s.; its fixing and wiring costs £2 10s.; representing a total of £10. A fuel boiler costs £4; a 40-gal. tank costs £2; and its fixing, etc., brings the total to £10. Running costs for consumptions of 60 kWh at 0.5d. per kWh and 1 to 1½ cwt. of fuel are 2s. 6d. and 3s. per week, respectively.

Heaters built to measure, such as the rectangular Thermic equipment seems to be ideal from the point of view of accommodation, particularly where the heater is mounted overhead; for not only does this conserve floor space, but in many cases full advantage can be taken of the building structure where it is fixed to improve overall heat insulation. These tanks are completed with the element, thermostat and manhole on the most convenient side.

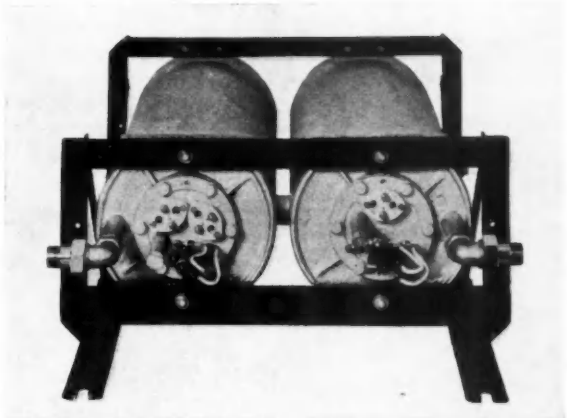


" Highlow " under-the-basin heater

The ceiling mounting idea has also received support from Messrs. Johnson & Phillips, Ltd., who have recently introduced a horizontal heater which operates on the restricted-feed principle, with an overall depth of only 24 in. They have also lately produced 1½-, 3- and 5-gal. rectangular non-pressure equipments, which they claim to be a distinct advance in the design of heaters to supply isolated points and are particularly useful for working in conjunction with electric cookers.

With the same object of reducing wall projection and to avoid dust traps behind the equipment Unity Heating, Ltd., has introduced a range of rectangular tanks. These equipments have twin inner cylindrical containers, each with its own immersion heater and thermostat. The second container is fed by the first and the latter has a higher loading which enables a greater quantity of hot water to be obtained at one time than is possible with a single container, but the overall loading is such as to permit as good a load factor.

Comparatively high loadings are also met with in the non-automatic equipment produced by Domestic Electrification, Ltd., and no doubt this explains the company's reference to the heaters as incorporating the geyser principle. Typical loadings are 1,000 W for a 1½-gal. tank, and 3,000 W for an 11-gal size.

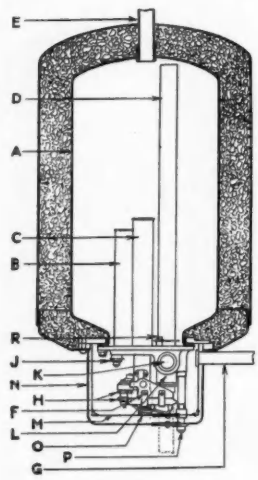


Twin containers of " Unity " rectangular heater

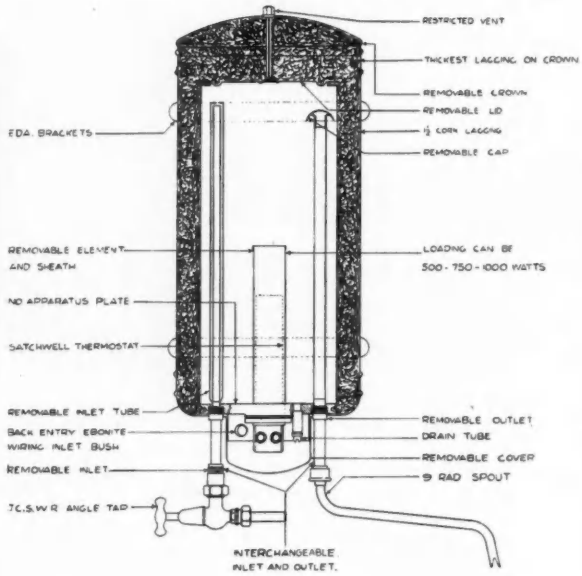
Somewhat similar equipment, but with even higher loadings (from 2 kW, 3 gal. to 4 kW, 12 gal.) has been introduced lately by the Geyser Manufacturing Co. This is of particular interest as the company has made gas geysers for twenty-five years or so, and its aim has been to provide something directly competitive with gas. The electric heaters are lower in first cost, cheaper to install, and more economical in operation, they say. They are unlagged, manually-controlled tanks, with immersers at the bottom, and they operate on the displacement principle. They are not intended to compete with thermostatically controlled equipment, but to fill the obvious gap where simple equipment is required mainly for bathroom service, for which the dominant factor is the length of time one individual is in occupation of the bathroom. Exclusively for this purpose speed beyond that point is not important.

" York " heaters supplied by Santon, Ltd., are also unlagged tanks with high loadings, but they are automatic in operation. They are claimed to have speeds nearly that of a geyser, but capacities for bathroom requirements. Float control is continuous with varying water level down to the outlet a good third way down the tank. Another particularly notable bathroom equipment developed is the " Sanspray," produced

by the same company. It is a spray-bath unit with provision for predetermining the temperature in the heater and a mixing device for varying the spray temperature. It is



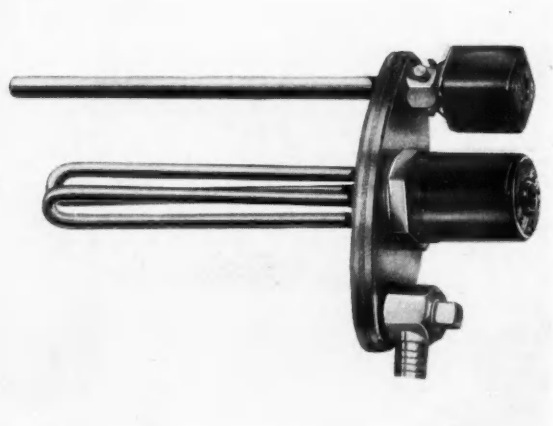
The Reyrolle cylindrical heater



Details of new Benjamin heater

A. Inner water container. B. Heater-tube. C. Thermostat-tube. D. Hot-water outlet-pipe. E. Outlet for expansion-pipe and hot-water outlet for pressure-type water-heater. F. Thermostat mercury-switch. G. Cable-entry for ¾in. Simplex conduit. H. Line-terminals. J. Earth-terminal. K. Outlet-pipe connection (the inlet-pipe connection is directly behind this). L. Alternative outlet-pipe and drain-plug. M. Leatheroid (insulating) lining. N. Outer thermostat-cover. O. Adjusting knob on thermostat. P. Nut fixing outer thermostat-cover. R. Baffle-plate over inlet-pipe.

said to have the peculiar advantage, not only of popularising a scientific way of bathing, but of conserving water generally. Then, of course, there is the geyser which has not enjoyed much support from the supply man, because of its high loading. But Santon, Ltd., claim it to be the simplest, safest



Hotpoint thermostat immerser and cock on 3-way flange in tank

and most satisfactory equipment, and the higher the load the more efficient the operation. The very long water channels and the small sectional area permit the elements to be actually immersed in the water, with a resistance to earth of from 10,000 to 15,000 ohms.

We cannot write of geysers without associating them with the name of George Nobbs & Co., Ltd., who have been responsible for much pioneering work in their development.

Most water-heating equipment on the market, however, is of the low loading (from 500 W) lagged automatic type, whether of pressure, non-pressure, cistern operation, or other of the variously-named types, and generally the greatest attention is given to the container construction. Most containers are of copper, but a notable exception is the containers employed in the Unity equipment. These are of nickel silver, and although consequently more expensive than copper or galvanised-iron ones, they are much stronger, and do not require protective tinning.

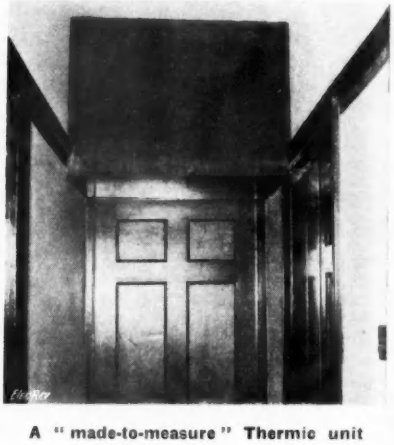
The heavy-gauge sheet copper used in the Sadia apparatus made by Aidas Electric, Ltd., is welded with copper, so that there is uniform strength and no stresses due to the uneven expansion of different metals. The makers claim that this is the most satisfactory method yet devised for jointing copper cylinders subjected to varying temperatures and pressures. In tinning the containers inside and out by total immersion the stresses set up by welding are removed by the consequent annealing. Tinning the inside of the containers is common practice nowadays, and this renders the water suitable for drinking purposes.

Another unusual method of construction is the Revo scheme. The container is spun in two end halves, and welded around its circular centre. The spherical ends permit high stresses and allow increased lagging at these points of greatest heat loss.

Fixing Methods

Among the troubles of the installation engineer is that of fixing, and Unity Heating have devised a means of avoiding strains on the outer container. The whole weight of the water containers is transferred direct to the fixing straps. Again, Reyrolle's have a special fixing framework which obviates difficulties by varied building construction. Holes can be drilled in the frame so as to give rigid support just where it is required.

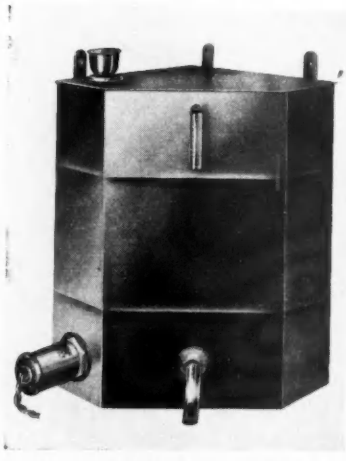
At least as much attention is given to the facilities for cleaning as to any other feature of modern water heating equipment, and it is almost universal to have an apparatus plate carrying the element, thermostat, &c., bolted to the container at the bottom, with a rubber gasket between the flanges. The English Electric Co., Ltd., pays particular attention to the strength of its apparatus plate, and stresses the desirability of minimising the possibility of damage from plumbers' tools.



A " made-to-measure " Thermic unit

On the Revo heater the top half of the gunmetal alloy flange is held in position by a lip spun from the container itself, which engages in a recess in the flange. The flange is purposely made small, consistent with accessibility of the terminals, &c., so as to reduce the heat losses at this vulnerable point.

The new heater of Benjamin Electric, Ltd., however, has no apparatus plate at all. The inlet and outlet, the element and sheath and the thermostat are all removable separately, and the top of the heater is detachable to afford ready access to the interior.



A G.M.C. high-load unlagged angle water heater

Perhaps the biggest novelty in this respect is in the " Gec-Gee " heater produced by Messrs. George Green & Co. All the electrical equipment is placed in from the top, on an easily removable copper spinning. Not only does this allow easy and quick inspection of the ele-

ment and thermostat, but it is never necessary to break a water joint.

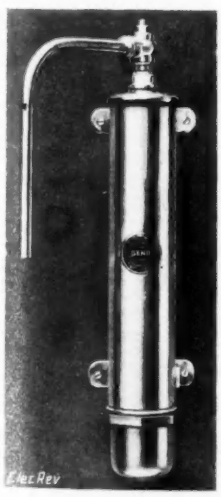
Mr. Waugh, of Messrs. Archibald Low & Sons, Ltd., says that in nine cases out of ten it is only necessary to clean the hot-water outlet and it is a big job to take off the base cover. Hence the "Highlow" (round as well as flat now) tanks specially designed for hard water. By removing a suitable screw-in cap in the top of the tank the outlet siphon cup can be removed and the outlet pipe can be cleaned by a rod or brush. Further, the inlet pipe can be cleaned in similar fashion by removing a cap on top of the exterior inlet connection, or the whole pipe can be taken out of the tank by dismantling the exterior connection.

"Eziot" flat non-automatic bath boiler

Closely allied with easy cleaning schemes are the many anti-furring ideas. In the "Densacone," now sold by Messrs. Drake & Gorham Wholesale, Ltd., and Benjamin Electric, Ltd., water evaporated from storage is condensed on the inner cone surface of the container top and runs down the surface and drips from the cone point into the inner heating chamber from which the hot water is fed. The nickel silvering of the container of the Unity heater prevents corrosion, and furr will not adhere to the special alloy housing tube employed in the Revo apparatus. Aidas & English Electric believe in low load density to overcome furring, and the former company says that 170 deg. F. should be the temperature limit in hard-water districts.

Messrs. Geo. Bray & Co., Ltd., say that low temperature of the resistor is of particular importance in hard-water districts. The resistor of the "Chromalox" immersion heater is completely embedded in refractory material which, in turn, is in direct contact with the sheath and the water, so that high temperature of the resistor cannot be attained. When heaters are fixed vertically from the top in hard water the company restricts the loading to the bottom ends of the blades, thus reducing any tendency to reach high temperature, with consequent decrease in "furring."

Dripping troubles seem now to have been forgotten, and one hears very little about varying water-pressure troubles. On the smaller "Highlow" tanks an adjustable valve permits regulation of the inflow to give best results at any pressure. There are no baffles or diaphragms, and the idea is to give the minimum overflow of hot water.



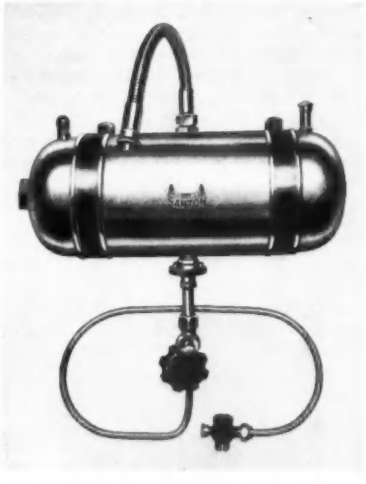
A "Genii" geyser

Temperature regulation difficulties never have been serious with automatic equipment, thanks to the modern thermostat, to which the electrical industry owes so much, and the "on" and "off" limits of automatic working can now be adjusted between very wide limits. For instance, in the storage heaters made by Messrs. A. Reyrolle & Co., Ltd., adjustment can be effected from the exterior between 120 deg. F. and 190 deg. F. A friction spring washer behind the adjusting knob ensures definite setting until it is deliberately reset. Further, by three-pole connections and a special inlet-plug three-heat control is available.

The principal element developments are flexible resistor units (so as to minimise space necessary for withdrawal, notable examples of which are found in "J. & P." equipment as well as in the "Thermolator" and other immersion units produced by Ferranti's), and towards sag prevention. The new "Benjamin" provides for interchangeability between 500-, 750-, and 1,000-W elements.

There are obvious advantages in being able to withdraw the element from a fixed sheath, but the embedded element is also favoured. The General Electric Co., Ltd., considers that the embedded type of withdrawable element will ensure reduction in maintenance costs, as the resistor is protected from the atmosphere and operates at a considerably lower temperature than that of the ordinary porcelain block construction.

Siemens-Schuckert (Gt. Britain), Ltd., make a point of ensuring good contact between the resistance wire and water by pressing their elements into special flat metal casings. This means for renewal complete replacement of the element and flange. The embedded type unit seems a natural development of the "Torribar" element, but for water heating purposes the sheath is of stainless steel to withstand immersion.



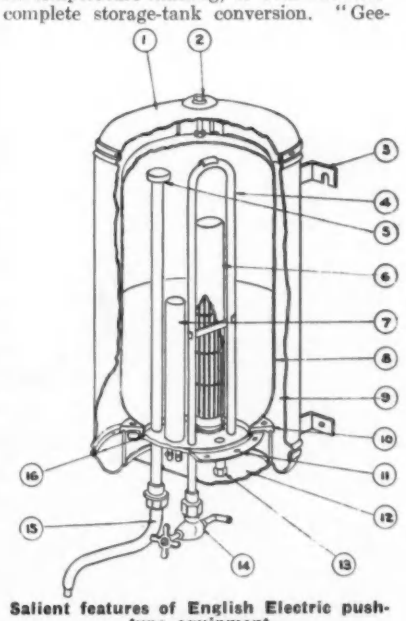
The Santon "San-Spray"

A 1½-gal. "Aidas" heater

From the electricity supply point of view, at least, the conversion of fuel systems, partially or wholly, is of outstanding importance, and all forms of separate immersion and circulator units contribute towards this. The latest move in this connection is the Aidas sheathless circulator. The water circulates along the path between four separate copper sheathed elements, and the company claims that the outer sheath is quite unnecessary. The result is lower cost, reduced weight and less furring. The easy fixing flange of the sheathed circulator is retained.

The "Circ-stat" is still one of the most important Santon products, for, as the company says, the untilled field is enormous. It can be used with a pilot lamp merely for temperature limiting, or with full automatic control for complete storage-tank conversion. "Gee-Gee" circulators are claimed to be different from most others because the circulating tube is removable, so that not only is it easy to remove deposit, but there is an entire absence of steam pockets.

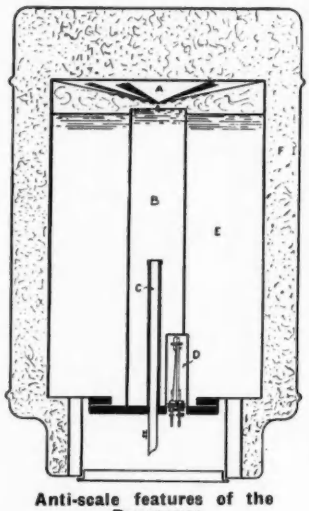
In most cases particular attention is given to rendering as simple as possible the fixing of immersion units. The range of outfits complete with template, sold by Siemens Electric Lamps & Supplies, Ltd., is a good example, and so is the Hotpoint three-way flange combination of element unit, thermostat and drain cock. There are also the Aidas



Salient features of English Electric push-type equipment

1. Sheet-steel outer case. 2. Ventilator for water chamber. 3. Wall-fixing bracket. 4. Non-return pipe. 5. Multi-point head. 6. Element. 7. Thermostat. 8. Welded copper water chamber. 9. Granulated cork packing. 10. Bottom ring. 11. Flange plate for water chamber (to facilitate removal of the flange plate for interior cleaning, two release screws are provided in a stirrup attached to the inside of the bottom cover). 12. Bottom cover. 13. Drain pipe. 14. Inlet cock. 15. Outlet pipe. 16. Rubber ring.

heating groups, each complete with a flange, counter flange, elements and thermostat. We learn that the side-entry "High-low" circulator has proved very popular in Scotland where top-entry equipment is impracticable. The Santon cylinder belt is probably the simplest means of tank conversion.



Anti-scale features of the Densacone

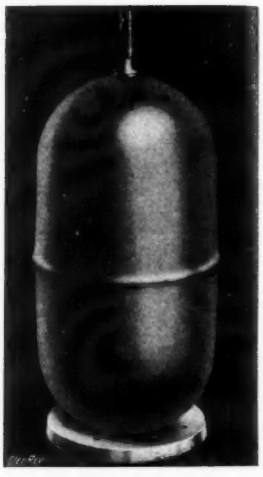
Of the several means available for heat insulating the tanks of conversion schemes, there are Arora mattresses by which a domestic heater can be fully insulated within an hour, and the system developed by Messrs. Drake & Gorham, Ltd., by which a tank can be readily insulated on site with granulated cork.

Under-the-basin heaters are proving popular within a limited field, and a notable example is the "Reymez" (Reyrolle) combined basin and heater. More recent introductions of this type of equipment (heater only) are the G.E.C. and High-low developments. In the latter the whole arrangement of pipes and mixing valves is supplied to measurement, so that only one water connection is required.

Hot water is essential for general cooking, and we still contend that increased business would result from properly associating the two services. Does not the new booster introduced by Messrs. Bulpitt & Sons, Ltd., present the idea for the supply of lower-temperature hot water for utility and higher-temperature hot water for cooking? It is intended for storage tanks (3 kW, 150 to 180 deg. F.) in canteens. The booster is mounted alongside and connected with the tanks at the correct height to ensure automatic filling. A small non-return valve prevents emptying back. It is controlled by an outlet tap.

The circulator produced by Arora Company is also designed for operation with, and external to, an existing hot-water tank. It is connected to the existing flow and return circuits. No thermostat is required in the circulator, but the company recommends one in the hot-water cylinder.

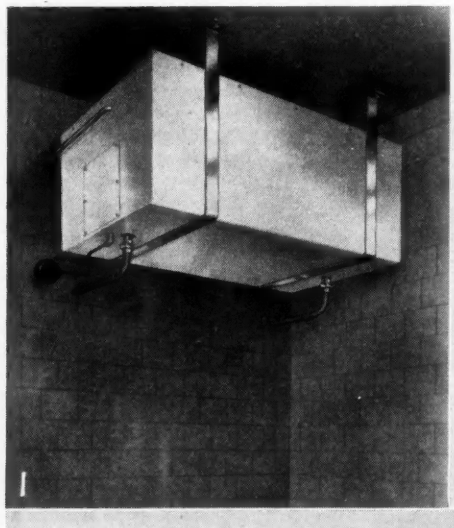
"Why a 1½-gallon Sadia water heater should be installed with every cooker" is the message on the front of a folder issued by Aidas Electric, Ltd., entitled "Of interest to all electricity supply engineers." That is good publicity, and a suggestion that is worth bearing in mind by supply engineers. Unless the heater will boil water, however, we are afraid we cannot concur with Aidas in the suggestion that the heater should entirely replace the kettle.


Spun container of the Revo water heater

And there are the many ways of doing with heaters what the kettle does so well—supplying small quantities of water at short notice. By means of the chromium-plated valve and a full bore inverted "U" anti-siphonic tube on the Revo, turbulence upon ingress of cold water is avoided, so that several small quantities of hot water may be drawn off consecutively without any appreciable drop in the outlet temperature. The Santon "Soon Hot" has an internal circulating system by which heated water is directed to the point of draw-off, so rendering available small quantities of hot water at short notice—a very useful device.

The "Hotstream" system of Domestic Electrification is designed for use in conjunction with a fuel heated system, and it is stated that thermostat control provides that electricity is on when the fire is out. Does that mean that the thermostat limits are wider than those for ordinary use? We have heard it said that for such cases the usual limits are often too narrow.

The centre portion of the heading block of this article shows some equipment at the showrooms of the Brompton and Kensington Electricity Supply Co., Ltd.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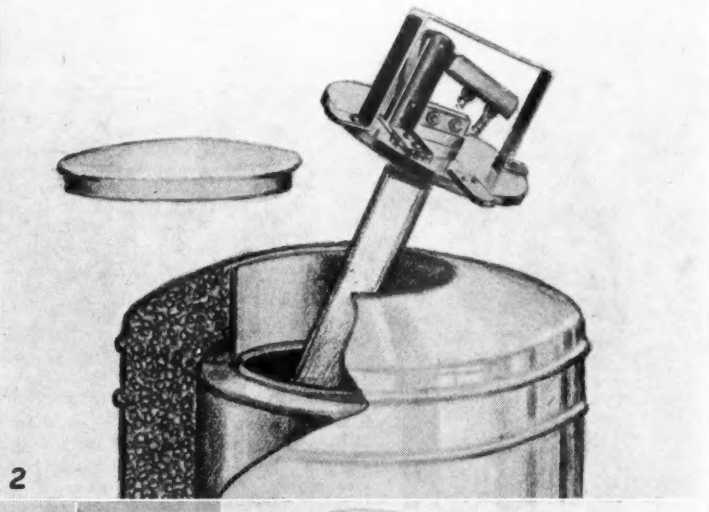
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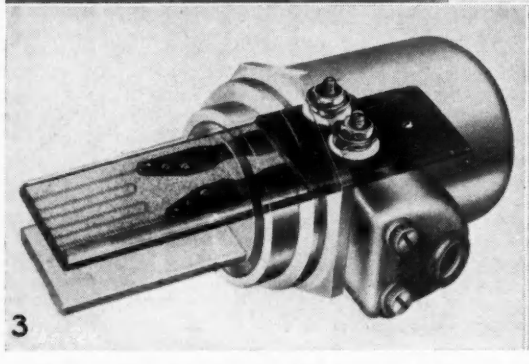
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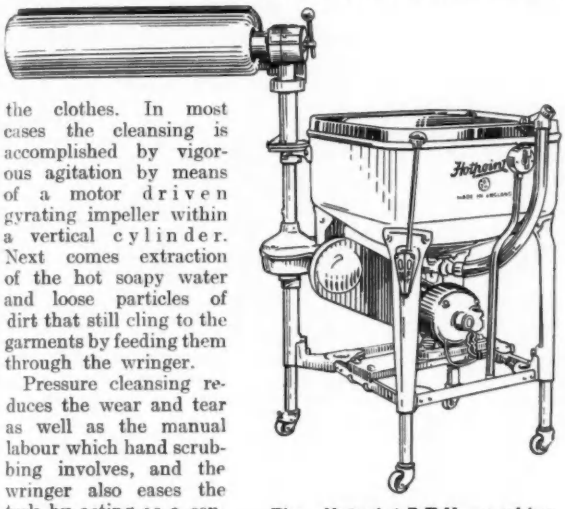
1. J. & P. ceiling fixing equipment. 2. Method of placing the electrical gear for the "Gee-Gee" storage water heater. 3. Construction of "Chromalox" blade immerser. 4. The Bulpitt 3-kW booster heater

The Home Laundry

Some notes on washers, boilers and ironing apparatus

The majority of housewives do their own washing and many more would follow suit if the drudgery could be eliminated. The following notes show that it is possible with modern electrical equipment to launder clothes quickly and efficiently without the hard work formerly involved.

WHEN a woman buys an electric clothes washer she expects it to render satisfactory service for a period of years. These machines, therefore, must be sturdily made of rustless materials, and the lubrication system employed must be free from any risk of grease or dirt contaminating the clothes. In most cases the cleansing is accomplished by vigorous agitation by means of a motor driven gyrating impeller within a vertical cylinder. Next comes extraction of the hot soapy water and loose particles of dirt that still cling to the garments by feeding them through the wringer.



The Hotpoint-B.T.H. washing machine and ironer

Pressure cleansing reduces the wear and tear as well as the manual labour which hand scrubbing involves, and the wringer also eases the task by acting as a conveyor of the garments from the tub to the basket. The wringer is so mounted as to be easily swung out of the way of the tub top, a quick pressure release device is incorporated to avoid jamming the rolls, and a single fractional-h.p. motor drives both agitator and wringer either directly or by combined enclosed belt and gearing.

The motor is usually about 0.25 h.p. and the average capacity is 10 gallons, enabling a tub-full (six or seven pounds) of clothes to be washed in from 5 to 10 minutes. The average size is 2 ft. in diameter and 3 ft. in height, or 4 ft. including the wringer, while the family wash can be done for a current consumption of little over 0.25 kWh.

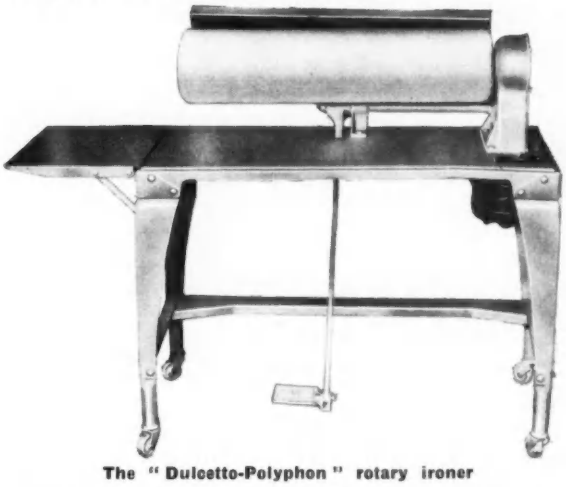
Prices have fallen somewhat, ranging from £9 9s. for semi-electric, and from £16 for all-electric models up to £35.

The Hotpoint-B.T.H. machine has a sediment trap below the gyrator and the 14-gallon square tub is extra large. The height is adjustable and the wringer has a flexible top roll and a firm bottom roll, thus providing greater squeezing surface and equal pressure throughout the width irrespective of the size of garment. For an extra £10 to the price of £35 a flat ironer is obtainable, which is easily interchangeable with the wringer and driven by the same motor; the heating "shoe" with 1,200-W elements built into it extends the whole length of the 26-in. roll.

The G.E.C. "Genalex" also has a roll ironer, interchangeable with the wringer, for £10 additional to the reduced price of £19 19s. A small pilot lamp indicates when the "shoe" heat is on, while provision is made for earthing the machine and draining the tub, which stands on adjustable castors.

The Hawkins "Supreme" has been improved in several respects and is now listed at £21. A 1-kW ironer is available for quick attachment in place of the wringer, and an ingenious accessory that fits on to most water taps will fill or empty the tub automatically without labour.

Sykes & Dyson, Ltd., have recently taken over the manufacture of the "Reliance" electric washing machine, and it has improved features. The tub is made in two types, special cast aluminium alloy, and vitreous enamel on "Armco" iron. The agitator, of a six-fin type instead of the more usual four, is propelled by a motion fitted with shock absorbers. The wringer is fitted with 14-in. rubber rollers.



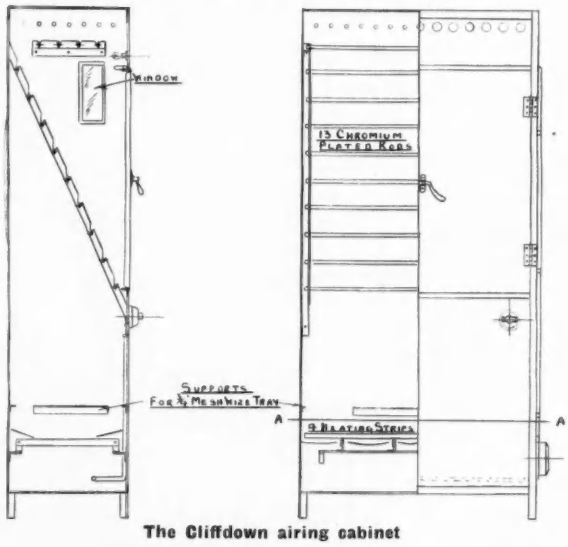
The "Dulcetto-Polyphon" rotary ironer

Besides the £19 19s. conventional wringer model another Dulcetto "Prima" machine is of the "spin-dry" type. It is priced at £30 9s. and has two tubs mounted side by side on a single base. One is the agitator washer and the other is the drying cylinder in which the clothes are dehydrated by centrifugal force, the water so extracted being pumped away and rinsing carried out by running water through a hose. A separate table pattern ironer is available for £19 19s.; the roller and 1,200-W heater are controlled by one foot pedal, and there is a separate knob for keeping the roller stationary while pressing.

The "Reliance" washing machine; a G.E.C. wash-boiler; and the Bulpitt wash-boiler with automatic immersion heater

The Sloan "Locomotive" is made for a.c. only with provision for earthing and a draw-off tap. Priced at £26 5s., and including a 500-W heating element for keeping the tub water hot, it will wash 6 lb. of dry clothes every seven minutes.

The "Revo" model has a semi-cylindrical tub with one flat side for placing against a wall. This machine is unusual



The Cliffdown airing cabinet

in several other respects, for it is listed at £16, includes a 4-kW heating element that is capable of boiling the clothes, and the washing mechanism is of the blower type driven by a 1/5-h.p. motor. The capacity is 14 gallons, and the wringer is hand operated.

The Green "Margery-Daw" appliance has a 12-gallon rectangular container with a hand-operated agitator. Its price is £11 11s., including a 3-kW "Gee-Gee" immersion heater with three-heat switch, which enables it to be used as a clothes boiler only when desired. A hand wringer of the clip-on variety costs £2 3s. extra.

For the convenience of flat dwellers, the £9 9s. household "Anyvac" washer can be converted into a kitchen table with an enamelled top, which is hinged to lift up, disclosing a good-sized tank divided into two sections. The larger is for washing clothes and the smaller for rinsing, the turbulence necessary for both these operations being created by air pressure, which is applied by attaching the blowing end of any ordinary vacuum cleaner to a small pipe fitting on the face of the washer. Conveniently fixed near to the dividing partition is a hand wringer, which folds down into the larger tank when the washer is not in use.

The Siemens-Schuckert machine differs from most, in that it is electrically heated to enable the clothes to be steeped, boiled, washed, and rinsed (in running water) in succession, the horizontal drum being rotated by a motor five times in each direction alternately.

Wash-boilers

Clothes boilers, which do not contain any gyrating mechanism, are available in a greater number of makes than washing machines, and their design seems to have become more uniform. Standing off the floor on three cast-metal feet, the inner container is usually of tinned copper with an outer sheet-metal case, either galvanised or enamelled in various colours.

A draw-off tap is provided and either a lift-off or hinged lid, while some models have a steam trap or condenser. In some cases the sump in which the heater used to be fitted has been abolished in order to provide a flat, easily cleaned bottom. When necessary, a perforated grid prevents the clothes coming into direct contact with the heater, which may be of the immersion type or clamped in sections to the underside of the inner water container.

Three-heat control is generally provided, the switch being sometimes foot-operated and inset in the boiler casing, but being often fitted on a wood block for mounting on the wall with a four-core (one for earthing) rubber-sheathed cable connection. Loadings range from 2 to 3.5 kW, and a slight extra charge is made for the provision of a safety device for automatically switching off in the event of the container boiling dry. Dimensions are approximately 1.5 ft. diameter and 2.5 ft. height, and capacities between 8 and 10 gallons.

A 5-gallon Bulpitt model is now obtainable for 27s. 6d., and the 29s. 6d. Hawkins "Supreme" is available down to the 6-gallon size; both of these are fitted with an automatic circulator, as is also the G.E.C. "Magnet" (which has a hot plate for the heating element), consisting of a central tube up which the hot, soapy water rises, being then sprayed through a percolator back on to the clothes. The Siemens "Xcel" boiler, introduced this year, has a cast-aluminium top provided with a recess arranged to drain back the water overflow when removing clothes; an optional vitreous-enamelled loose top converts the boiler into a table.

The prices of these and other standard models, such as the Nathan & Allen ("Dugdale"), Green, Archibald Low, Burnley "Burco," Sykes & Dyson, and others are within the Revo price range of from £3 3s. to £6.

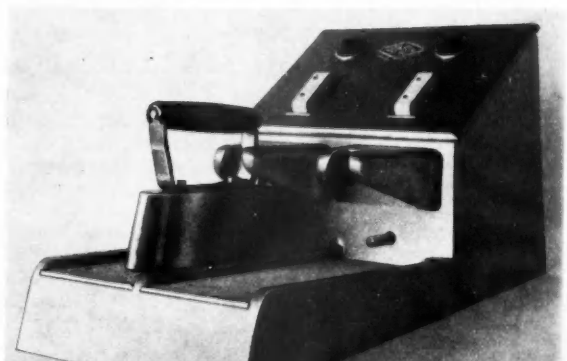
Users' Preferences

While the time-saving and drudgery-eliminating capabilities of the complete washer-wringer are generally acknowledged, it must be borne in mind that these factors cannot by any means be assessed at their true value in households of strictly limited incomes. Hence the materially greater demand by the masses for a plain clothes boiler of modest first cost, as distinct from the classes patronising public laundries or preferring machine washing at home.

Urged by these considerations, Veritys, Ltd., have based the design of their latest type of wash-boiler on the ascertained requirements of both user and supply authority. The result is an economical price with full consideration of the question of maintenance charges.

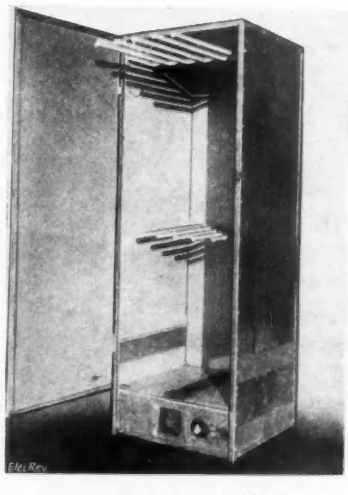
The heating elements have been made easily replaceable, and foot-press switches are fitted to the outer casing in a recess free from condensation and splashes which may run down the outside of the boiler. The draw-off tap is chromium plated, and the cable gland at the side has an earthing terminal, but it can be supplied with a switch for wall mounting if desired. This boiler is of 10 gallons capacity, and is made low enough to be pushed out of the way under the scullery draining board.

The patent lid is specially shaped to prevent condensed steam dripping on to the floor or running down the side of



The "Modinstal" electric iron stand

the boiler. As there is no knob in the middle, the top is perfectly flat and can be used as a table. The lid is not hinged, but entirely detachable to facilitate interior cleaning, while the handles are at the side and therefore always cool. They are formed in the shape of hooks for clipping on to the side of the boiler, so that the lid may be used as a tray into which the hot clothes can be placed for carrying purposes. Also the inner copper water container and the outer case are units which can easily be taken apart.



Dowsing's airing cabinet

Airing Cabinets

For airing clothes, or drying garments indoors irrespective of weather conditions, Dowsing's all-metal cabinets with interior racks and wire trays are constructed in a manner that ensures rapid circulation of hot air, which rises from a compartment at the base containing the heating element with three-heat con-

Modern Electric Clocks

A wide range of styles

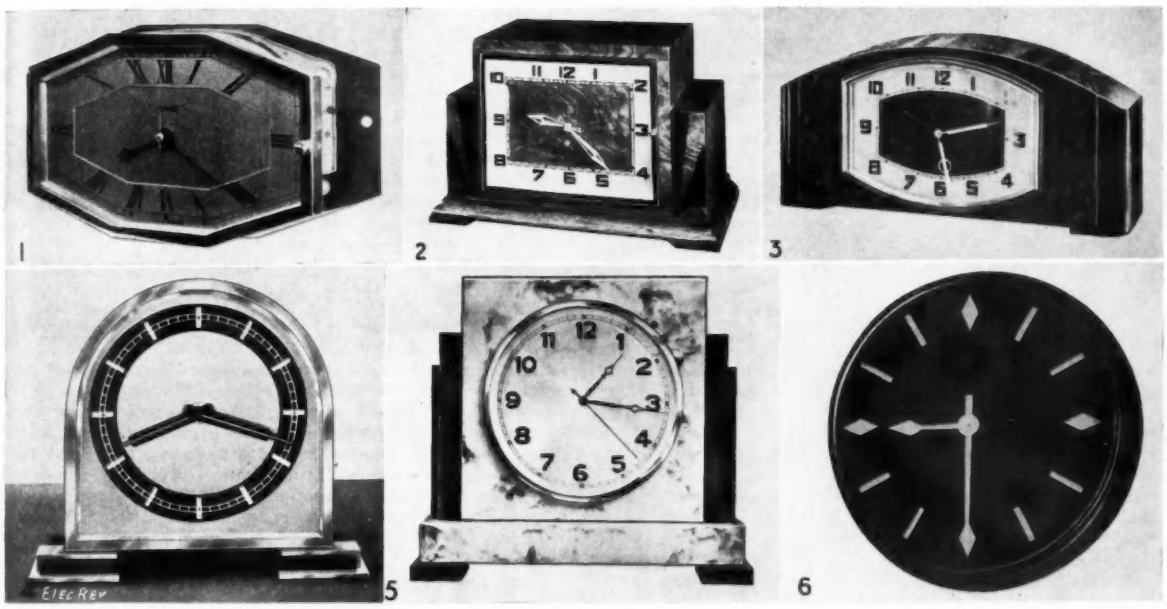
Electric clocks constitute an attractive selling line. The market for them is continually growing, as is also the range of available types, both mains-driven and otherwise. Their many points of public appeal include extreme accuracy of time-keeping, small initial cost and quite negligible running cost, and ornamental value.

ONE of the simplest types of electric timepiece is the synchronous mains-driven pattern, for a.c. only, which is actuated by a miniature motor specially constructed to keep in step with the frequency of the supply system, and cannot, therefore, run fast or slow. It does not need winding or adjustment, and is practically silent in operation. The public demand for this type of clock has grown appreciably during the last year or so, and, since the system frequency is time-controlled in over 300 areas of supply, the widespread field of application is self evident.

These clocks are obtainable in all sizes, shapes, and styles, including barrels for modernising old timepieces and also for insetting flush in walls, fireplace mantels, radio sets, and even furniture. The prices range from about 30s. to as many pounds, with alarm clocks retailing at from 21s. to 25s.

"Synclocks" were pioneers of their line. They are self-starting, and an oil-bath lubricates the principal gearing. Neither the timekeeping nor the striking and chiming mechanism needs winding, and the chimes are self-correcting, making it unnecessary to wait for the clock to strike when altering the hands. Not one of the Ferranti range has had to be superseded or deleted from the list since the company first entered the market. A seconds hand is fitted, but this make is not self-starting. The 25s. rectangular alarm clock introduced this year has a buzzer in place of the usual bell and is designed on a 24-hour alarm setting basis; when stopped by depressing a knob on top the clock automatically resets itself for the next day. Smith's offer a wide selection, including combined clocks and table lamps, other varieties of which are those of Falk, Stadelmann & Co., Ltd., the Walker Fender Co., and the East London Rubber Co.

In addition to pendulum master clocks, electro-magnetically actuated and transmitting impulses for driving slave dials at a distance, Gent, Synchronome, and Gillett & Johnston synchronous a.c. mechanisms are now being supplied as well. Bulle clocks have been improved by the adoption of a knife-edge suspension principle, and a bob pendulum has replaced the old visible swinging magnet coil. This type is now obtainable for both mains and battery operation.



Six attractive designs: 1. Ferranti. 2. Everett, Edgcumbe. 3. Philips. 4. Telephone Manufacturing Co. 5. Euston Manufacturing Co. 6. Synchronome

Synchronous a.c. timepieces made by British Electric Meters embody a double worm drive. G.E.C. clocks are self-starting, and one pattern has a plate-glass dial which is illuminated by light transmitted laterally through the glass. Other models include the "Sun," Philips, Telephone Manufacturing Co., Bowden-Muirhead, "Cyntra," Richard, Time Recorder, and the "Euston." Standard designs are for 50-cycle a.c. mains only, but are suitable for any voltage between 200 and 250. The driving-motor speed is usually either 120 or 200 r.p.m., and the running cost is about 1s. per annum per clock.

Some makers provide an aperture in the dial through which a rotating disc is visible to indicate stoppage in the rare event of supply failure, while the hands of the Empire Trading Co.'s models can be reset without stopping the clock.

Whether plain, striking, chiming, or of the alarm pattern, common features of all synchronous timepieces are their simple construction and unfailing accuracy of timekeeping.

The Home Laundry *(continued from previous page)*

trol and pilot lamp. The 2,000-W cabinet is 2 ft. by 2 ft. and 5 ft. high, listed at £23, while the 500-W cupboard costs £5 5s. "Cliffdown" electric drying cabinets are also available.

The widespread use of the general purpose flat iron is indicated by the very many different makes available to choose from. Made in from 3 to 8-lb. sizes, loaded at 300 to 500 W, the most favoured weights seem to be 4 or 5 lb., loaded at 450 W. Prices range from the 7s. 6d. Sloan and "Homefyre" up to 19s. 6d. for such coloured enamel models as the Carron "Esto" and Moseley. In between are the standard Premier, Siemens, G.E.C., Revo, "Alneco," Brown, "Simco," McLeod, Wholesale Fittings Co., nickel- and chromium-plated types. The Dowsing range includes universal voltage models.

Most reputable makes are provided with a heel rest, obviating the need for a separate stand, and a shaped handle with thumb rest. The handle of the Berkeley & Young iron is made of moulded synthetic material in place of the usual varnished wood, and this model possesses a groove machined along the entire length of both sides of the sole plate, enabling the user to iron underneath buttons. Similar button recesses, but on each side of the point only, are features of the Siemens-Schuckert and "Hotpoint" irons. The last-named is provided with a ball-hinged connector and a flex support for clamping to the table-edge to prevent the flex getting in the way. The use of side-entry connectors, first introduced by Siemens, and non-kinking flexible cable is increasing.

Travellers' irons, weighing about 3 lb. with 250-W loading, such as the Revo, Siemens, and Hawkins (which has an aperture for heating curling irons and is suitable for universal voltage), are obtainable at from 15s. 6d. upwards, with a detachable handle for packing in a carrying case. The universal-voltage "Dulcetto" costs 7s. 6d. and weighs 2 lb. with 175-W loading.

The "Modinstal" iron is flexless, having a thermal storage element embedded in cement. It is heated by being placed on a sloping control desk panel having an automatic plunger-operated switch. Dowsing's cordless irons are preheated in a similar fashion.

Vacuum Cleaners and Polishers

Labour-saving devices with a wide range

The diversity of trade names under which suction floor cleaners are sold and the number of concerns, electrical and otherwise, which market them, are indications of the widespread demand believed to exist for this class of machine.

THE upright canister type of vacuum cleaner relies on suction alone and is probably the quietest in operation, but it seems to have been somewhat neglected in the effort to make constructional improvements and reduce prices.

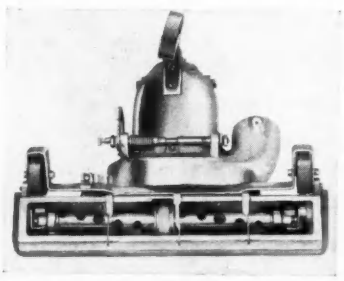
The "Norfolk" (British Electric Equipment Co., Ltd.) weighs about 14 lb. and is priced at £15 15s. It is robustly made, the upper aluminium die-casting housing a universal 200-W motor and a well-designed two-stage turbine fan running in ball bearings and capable of dealing with a really large volume of air. The lower circular canister is detachable for removal of the dust, in which it settles prior to the air escaping through the filter bag. The latter thus remains relatively clean and is specially supported to prevent it collapsing.

The "Norfolk" canister type cleaner

The "Tellus" has a 225-W motor and a circular canister, while the "Welbeck," which has a 175-W B.T.H. motor and skids at the bottom of the dust collector, is of rectangular shape and suitably proportioned for comfortably standing on the average staircase tread. Moreover, it is claimed that the dust does not swirl round and tend to clog the filter, but settles in the corners.

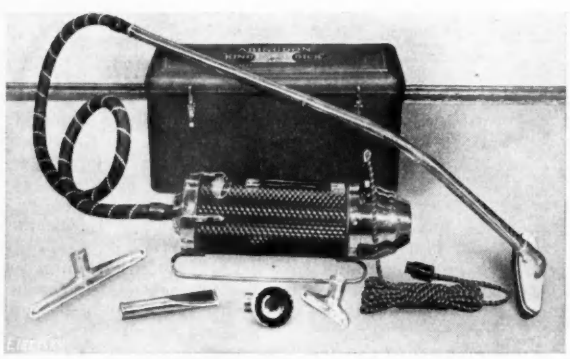
Another feature is the swivel hose coupling. The large bakelite nut on the end of the metal hose end is screwed into the container, thus not only overcoming any tendency for the hose to pull out while the cleaner is in use, but also completely insulating the operator from the machine. The metal hose end is so attached to this nut as to be free to rotate in either direction, and so prevents kinking of the hose. The filter is of original design. The fabric is slipped over a coil spring and anchored at its lower end to a metal plate, and at its upper end to a metal ring which fits over the mouth of the dirt container. A rod attached to the lower plate extends upward through the filter, and is fitted with a rubber pad at the top end. A metal shield extends downwards from the upper ring for about one third the length of the filter, and drops inside the container. The weight of the motor on top of the centre rod depresses the rod and keeps the filter fully extended inside the container.

The "Eureka" fitted with a hot-air attachment



An under view of "Hotpoint" showing the revolving brushes

The next class of enclosed dust bag machine is similar to the canister design in so far as it relies on suction and utilises a flexible hose pipe to which variously shaped nozzles are attached. But it differs in that the body is a horizontal cylinder on metal runners or small castor wheels.



The "King Dick" cleaner with accessories

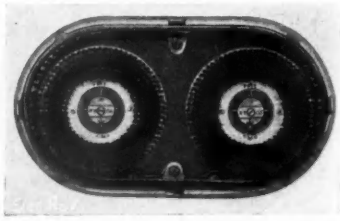
Some examples are the New "Electrolux," a well-finished machine sold in a special box with, besides standard equipment, a shampooing attachment, a dry polisher for floors, an air purifying device, a library brush, etc., at 19 guineas. The "Silovim" (C. C. A. Vacuum Cleaners) retails at £11 and it has not been considered necessary to modify the "Siemens-Xcel," in the design of which special care was taken to allow free air flow; the internal shape of the casing is such as to avoid dust packing at one end and thereby tending to reduce the efficiency of the machine, which is supplied in a box complete with accessories at 12 guineas.

The "Welbeck" cleaner

An old-established cleaner which has undergone little change is the "Mary Ann" at £6 16s. 6d., while both the "Auto-Maid" and "New Centralette," a smaller model of the "Silovim," are priced round about £6. The "Eleta" is made by Vacuums, Ltd., who distribute the "Bustler," but it is of the cylindrical type, special attention having been paid to insulation. The "Duco," which is designed on usual lines, is sold at £4 19s. 6d. by Brown Bros., Ltd. A high quality and unusually quiet machine is the "King Dick" (Abingdon Works, Ltd.), costing 12 guineas.

Both the canister and cylindrical varieties suffer somewhat from the disadvantage that flexible hose, extension pieces and nozzles have to be assembled and fitted to the machine before it can be used. In contrast, what may be classed as the "broom handle" pattern, which has an external dust bag, can be put away all ready for instant use. Attachments are not essential, though available in some cases, with the result that the owner tends to utilise the machine more frequently for the occasional removal of crumbs and such like purposes, instead of limiting vacuuming to "cleaning day."

The large available choice of such upright machines includes the G. E. C. "Magnet" cleaner which is supplied for all standard voltages and is fitted with a revolving brush inside the nozzle; the price is £15 15s. with a large variety of attachments. Powerful suction is a feature of the "Eureka," which is pushed along on four wheels; an extra length of flex is supplied with this cleaner for use when the handle is removed, thereby giving a cleaning radius of 45 feet. The air displacement through the floor nozzle is 156 cu. ft. per min.



An underneath view of the "Magnet" polisher

Both the Hotpoint "Junior" (£10 17s.) and "Duplex" (15 guineas) have motor-driven brushes and rubber bumpers around the carpet sweeper, three castors being provided to support the latter. In other respects they conform with

general practice although a revolving floor polisher can be fitted as an extra.

A beater is employed in both the "Silobeta" model (15 guineas) and the Hoover "900," "750" and "425" models a distinguishing feature of the first two Hoover models being a headlight fixed on top of the motor casing. The "Silobeta" is designed on similar lines to the "Silovac" (C. C. A. Vacuum Cleaners, Ltd.), in which silence has been made a special feature (price, 12 guineas).

The Hoover cleaner fitted with a "headlight"

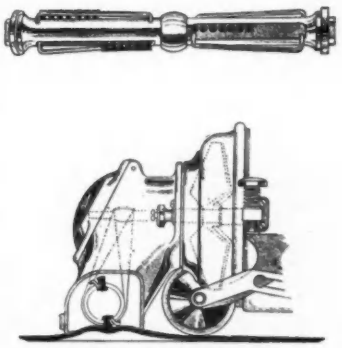
Other cleaners designed on orthodox lines with an external dust bag are the Gilbert "Polar Cub" (costing only £3 15s.), the "Supreme" (L. G. Hawkins) at £7 10s., the Moseley "Eddo" (10 guineas), and the "Bustler" (Vacuums, Ltd.), which is priced at £6 19s. 6d.

British National Electrics, Ltd., are marketing a range of five cleaners, comprising four floor models and a hand vacuum cleaner. The floor models range in price from £5 12s. 6d. to £13 10s. These cleaners are exactly similar to the machines which have been made in the past by Landers, Frary & Clark, U.S.A., under the trade name "Universal," but they are now to be manufactured throughout by the company at Mossend, Lanarkshire.

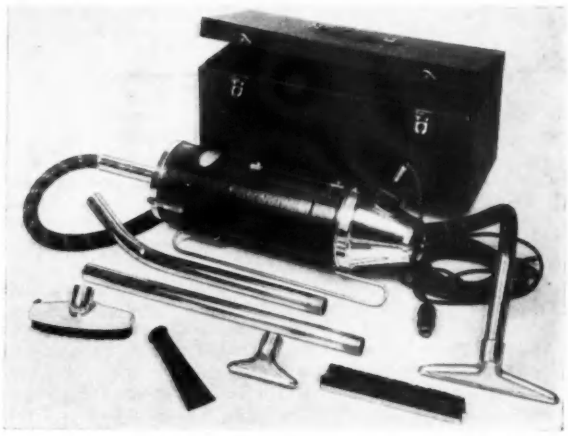
The British Vacuum Cleaner Co.'s "Goblin" is obtainable in the cylindrical form for £6 16s. 6d. and £8 8s., or packed in a box for £10 10s. Another cylinder, priced at £5 15s. 6d., has a handle for upright use as a "sweeper," the carpet nozzle being fitted with an agitator device. The upright external dust-bag model is listed at £6 16s. 6d., and can be used single-handed for dusting.

Then there are the small vacuum machines, light enough to be held in one hand for dusting purposes, such as the 37s. 6d. Gilbert, 59s. 6d. Hawkins, the Hoover and the British National. These are adaptable to a surprising variety of uses. A little over 4 lb. is the usual weight of the miniature models and they can be employed for dusting clothes and cleaning draperies, as well as household and motor car upholstery.

Finally, a few manufacturers offer electric floor polishers, notably the G. E. C. whose "Magnet" polisher (12 guineas) embodies two horizontal revolving brushes, illustrated on page 528, whereas the "Silo-Polifor" (C. C. A.) (26 guineas) and "Hotpoint" use a cylindrical brush. The Hawkins "Supreme" (£6 15s.) has one horizontal revolving brush, while the "Electrolux" polisher has three horizontal brush-holding discs which revolve at 750 r.p.m., two the same way and the third in the opposite direction. One of the three is set for applying an even coat of polish over the surface of the floor and another set for polishing.



A diagram of the Silobeta



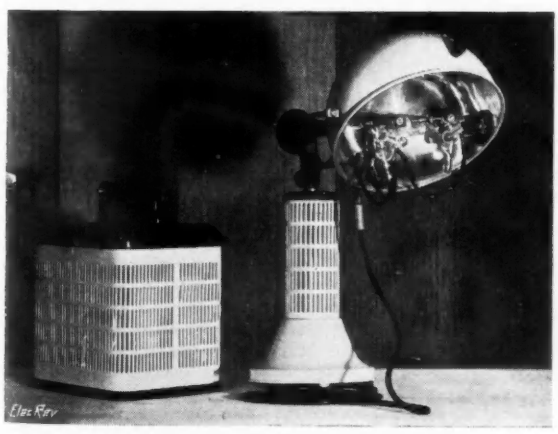
The "Auto-Maid" vacuum cleaner

Electric Health Appliances

Simple apparatus for home use

Quite apart from professional electro-medical treatment, that of simple ailments can be undertaken safely, and stimulation and invigoration indulged in beneficially, at home with the aid of simple electrical apparatus such as those referred to in this article.

MANY types of electrical health appliances are available for which expert supervision is not required although such equipment, while not complicated in character, must tend to remain somewhat expensive in first cost until more general home use increases the demand.



The Hanovia "Homesun" lamp

The therapeutic value of most of these devices is appreciable and their operating cost insignificant. They may be conveniently classed into (i) lamps emitting luminous rays, (ii) radiators for irradiation and heating pads, (iii) electrical stimulators and electro-mechanical vibrators, (iv) air-conditioning plant.

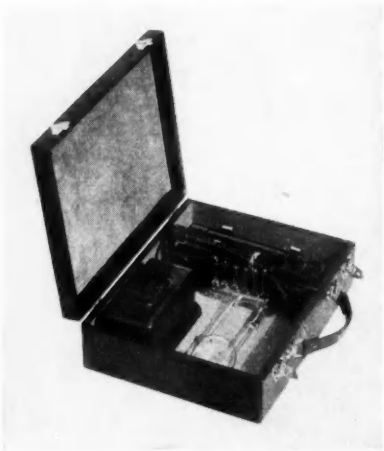
"Grosvenor" infra-red radiator

The acknowledged benefits of judicious sun-bathing can be continued throughout the winter months, indoors, by the use of different kinds of lamps specially devised to produce light which is rich in its tonic effect through the inclusion of ultra-violet rays. They are obtainable as table or floor standards, with a suitable transformer for mains operation, at from five to twenty guineas each. The Medical Supply Association's "Medi-sun" mercury-vapour lamp has a reflector hood that is adjustable for general application; a specially shaped front projector with a variable aperture is attachable for the treatment of local

areas, and there are quartz internal applicators for the ear, nose, throat, and teeth.

The "Hanovia" is also of the quartz mercury-vapour type, and has recently been redesigned. The "Quain" is of a different sort, having either one 750-W or 2,000-W twin carbon arcs housed in a bowl reflector, in which a heater can be included if desired.

Both the 150-W B.T.H. "Mazda" and the 400-W G.E.C. "Osram" bulbs contain a filament for heating a pair of tungsten electrodes sufficiently to cause an arc to form across the gap, the arc being maintained in an atmosphere of mercury vapour; these two lamps are suitable for a.c. only.



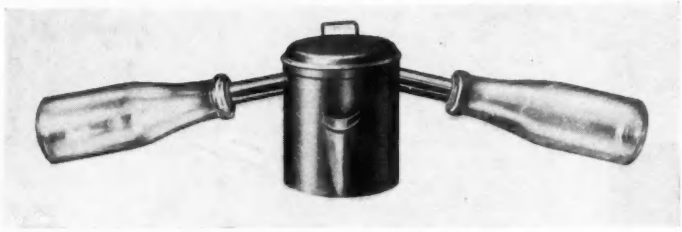
A violet-ray high-frequency stimulator (Calvete)

The 500-W "Neron-Vitalux" (Radiological Co.) had a bluish glass bulb, frosted on the inside, which cuts off radiation below a wave-length of 270 mμ. The Philips "Ultrasol" has two bulbs sealed together, the inner one containing an arc in series with a filament in the outer, while the special glass permits only the beneficial rays to be transmitted.

The judicious use of such lamps helps to maintain general well-being and increases the vitality of the convalescent. Natural sunlight also contains stimulating and invigorating warm rays which are invisible. These infra-red rays are produced artificially by heat radiators, which may be either faintly luminous or of the "black body" variety. Of the last mentioned type, the Medical Supply Association's "Grosvenor" infra-red radiator consists of a slab heater in a rectangular reflector mounted on an adjustable floor standard and listed at £15 15s. The smaller "Bio-ray" bowl reflector, priced at £3 15s. 6d., emits both infra-red and radiant heat for the treatment of rheumatic ailments, sprains, bruises, &c.

Dowsing's 200-W hand lamp for the application of luminous heat rays to joints costs 37s. 6d., and a folding limb light-bath priced at £13 5s. is fitted with six tungsten filament lamps totalling 750 W. The 30s. Calvete hand lamp for heat ray therapy supersedes hot towel applications to the scalp and face; the 200-W bulb contains a carbon filament and colour screens to clip on to the reflector are supplied for treating skin eruptions.

The Dulcetto "Vita-sun" lamp has a parabolic reflector that will accommodate a cone-type infra-red heater element. Alternatively, a gas-filled filament lamp may be substituted which has a quartz bulb permeable to ultra-violet light. The consumption is 0.5 kWh, the table model costing eight and the floor standard ten guineas.



The Green automatic electric distiller

For the application of surface heat electric blankets are invaluable in the sick-room and nursery, and they act as efficient bed airers. The "Thermega" is available from a 72 in. by 64 in. size, in which the patient may be rolled, down to small pads for localised application. They are made flexible or stiff-backed with single or three-heat control, which enables the maximum temperature to be pre-set and maintained constant during use. Universal voltage models are obtainable and also washable and waterproof covers. The standard size of 44 in. by 32 in. costs £3 3s. and the 16 in. by 12 in. pad £1 11s. 6d.

The Hawkins pad is listed at 27s. 6d., in six colours, size 14.5 in. by 12 in. The new 60-W single heat "Auto-Maid" pad retails at 15s. and the blanket at 37s. 6d. The "Milliwatt" electric cushion costs 27s. 6d., and has four thermostatic automatic cut-outs, while the new blanket has twelve thermostats and three-heat control. A new hot compress with head band for the eye or ear, which retails at 25s., has one thermostat and a three-heat rotary regulator.

Among bed warmers to take the place of hot water bottles are the 200-W Green aluminium cylinder (10s. 6d.), the Cooper-Stewart flat disc (17s. 6d.), Dowsing's triangular porcelain (27s. 3d.), and the 500-W G.E.C. triangular porcelain fitted with a protective device at 35s. These are of the cordless heat-storage type, but the Sturge & Baker is a heat cylinder surrounded by a wooden frame, loaded at 75 W for 20s. and at 100 W for 32s. 6d.

So-called violet-ray apparatus (not to be confused with ultra-violet ray lamps) is really a coil-type generator of high-frequency oscillating currents, which are applied by means of evacuated glass electrodes. The name is derived from the purple fluorescent glow that occurs when the discharge takes place through the vacuum applicators, which are made in varied shapes according to requirements for tissue stimulation. A controlling knob is provided for strengthening or weakening the discharge.

The Sterilizair

In the Calvete apparatus the coils and condenser are enclosed in bakelite, the whole outfit being packed in a carrying case weighing from 3 to 16 lb., and priced at from £2 17s. 6d. to £8, according to size and number of applicators desired. In addition to the universal voltage mains-operated sets, a 6-V accumulator outfit is available for £4 15s.

The smallest Hawkins set costs 59s. 6d. and the Dulcetto £3 17s. 6d., or six guineas for battery operation. The user should preferably stand on insulating flooring and avoid contact with earthed objects.

The G.E.C. vibro-massage motor is of 25 W, weighs 4 lb., and is listed at £4 15s., being entirely encased in bakelite and having a two-speed switch in the handle. The Calvete machine weighs 4.5 lb. and costs £3 15s., while the five-guinea Hawkins is equipped with a patented speed control device. The invigorating vibratory massage action is produced by a specially shaped rubber pad attached to the end of the motor shaft extension.

The atmosphere of living rooms can be reconditioned by the "Sterilizair." This self-contained machine is obtainable in several finishes as a floor standard or for suspension from the ceiling. An inverted motor drives a horizontal fan, which draws the air upward and discharges it towards the celling in order to prevent the creation of draughts.

The vitiated air is sucked in through a filter cloth, which can be easily removed and washed; while a spiral driven by the fan shaft extension continuously raises water from a trough below and sprays it on to the filter cloth, thus keeping it perpetually moist so that the air is both cleaned and humidified; disinfectant or perfume can be added to the water if desired. The 40-W model weighs 15 lb.

"Ozonair" deodorising outfits are listed at from £4 15s. for the 5-W size up to £27 with and without an electric fan. The ozone is generated by subjecting air to a silent electrical discharge.

The Premier bronchitis kettle, for producing a warm and moist steamy atmosphere, holds 4 pints and has a filler for adding water without switching off; the 650-W size costs £3 15s., and a safety cut-out can be fitted. Dowsing's 4-pint bronchitis kettle is loaded to 850 W and priced at £4 15s. It is provided with a three-heat switch, safety cut-out, gauge glass, and filler cap, the steam spreader and tube being removable.

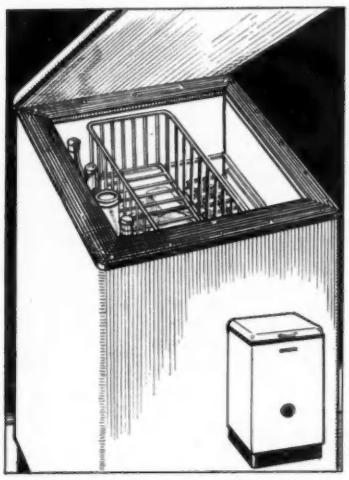
The Green distiller, costing 50s., produces two pints of distilled water about 1 kWh. Its loading is 200 W and dimensions are 7.5 in. by 22 in. by 8.5 in. It operates automatically.

Refrigerator Developments

Some notes on the trend of design

In this country we have been slow to take advantage of the refrigerator, partly owing to cost, but more particularly because we do not experience extreme temperatures. Even in recent years, when a number of manufacturers have conducted an intensive sales campaign, the public has been content to look upon it as a luxury and the supply authorities have not been very encouraging.

WE found that refrigerator manufacturers supported the Lightfoot Company's statement that there is a noticeable change for the better in the outlook of the supply authorities, many of whom are seeing that it means a constant load, and are therefore co-operating with the manufacturers. It does seem astonishing that this realisation should have taken so long in view of the experience of the American supply industry.



A sketch of the new "Westinghouse Compact" model

Direct selling to the public is adopted by many firms who say they have found traders and supply companies too apathetic, although the Lightfoot Refrigeration Co. claims to sell about 80 per cent. through the trade. It is noticeable, however, that an increasing amount of business is being done with builders who, when constructing blocks of flats, especially around the London area, are fitting electric refrigerators as standard kitchen equipment. It is with this in view that the new Electrolux built-in model "M.1" has been introduced.

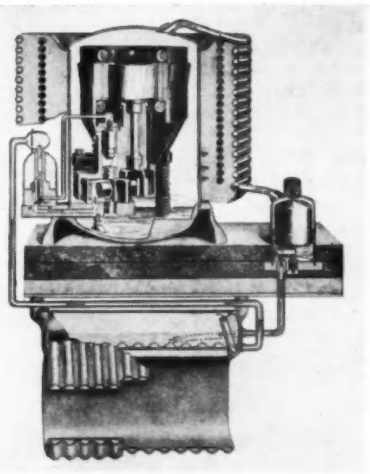
Types on the Market

Broadly, there are two types of domestic electric refrigerators on the market—compression and absorption. In the former type an electrically driven compressor maintains a difference of pressure in the system to allow for evaporation (during which heat is absorbed) and condensation of the refrigerant, but in the latter type the refrigerant in the gaseous form is absorbed by water, from which it is liberated by heat from a suitable source.

The outstanding example of the absorption type is the Electrolux, in which evaporation is rendered possible without any appreciable difference in pressure and without any moving parts. There are six models of this type ranging from the "L1" (1 cu. ft.) priced at £19 10s., which, with the "L2," are the only air-cooled models, all the rest being water-cooled, to the "D.10" (10.1 cu. ft.), costing £85.

While the inherent advantages of electrical automatic control alone strongly favour the modern method of operation, many of the gas supply undertakings have realised the benefits of the refrigeration load and are concentrating upon pushing it as much as possible. Incidentally, the "L.1" is also made as a built-in cabinet model (illus.) for flats and small houses, while the "L.2" has ten freezing speeds.

Other makers have adopted the compression type. Good examples of this are "Westinghouse" refrigerators (Lightfoot Co.). Although this company agrees that the 5 to 6 cu. ft. models are the most popular at the moment it is about to introduce a 2 cu. ft. model known as the D.C.20 "Compact," priced at £28 10s. This cabinet is of unusual chest construction, *i.e.*, with the door or lid at the top.



A sectional view of the B.T.H. compressor

A feature of all the "Lightfoot" refrigerators is the so-called "Dual-automatic" control which prevents the apparatus being put out of action indefinitely by an overload on the mains, or lightning. We were shown the new "Dulux" enamel exterior finish and found that however much we twisted a piece of metal coated with it the enamel did not crack. It is because of this, and its porcelain-like appearance, that the company only provides a porcelain finish to order.

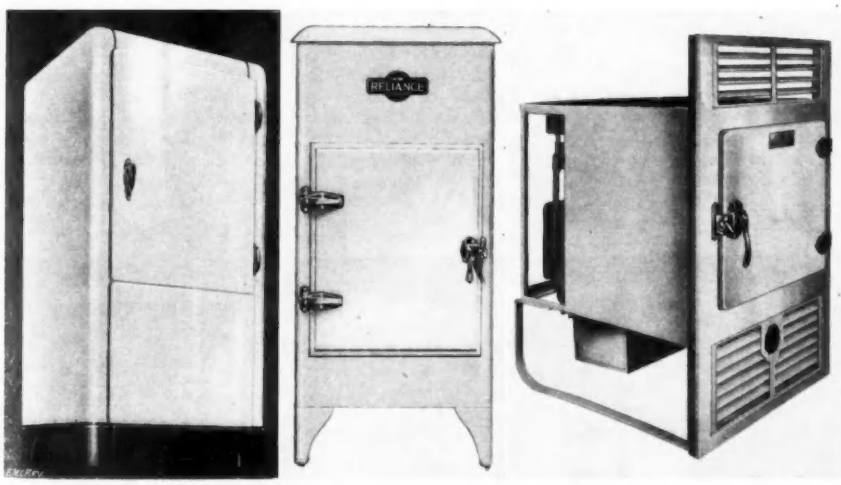
So far as we could ascertain, this company and the International Refrigerator Co. (B.T.H.) are the only manufacturers offering a four-year guarantee.

The B.T.H. refrigerators, which are now made at Rugby, have a hermetically sealed compressor unit above the refrigerator. There is no definite ruling regarding the position of the compressor. Those manufacturers who place it at the top claim greater economy in running since the heat from the compressor rises away from the machine, but whereas the B.T.H. employs natural draught for cooling the "Westinghouse" uses a forced draught.

The H.M.V. Co., which, although experienced in refrigerator manufacture in the United States, is a newcomer to this country, claims that no increased consumption is noticeable from placing the compressor below the cabinet. Again, a full range of sizes is available, and the "streamline" curves of this equipment must make a definite appeal to many people. A special pump is incorporated for silent operation.

A wide range of refrigerators is also offered by Frigidaire, Ltd., all incorporating seven freezing speeds and a defrosting control, and by Kelvinator, Ltd. A feature of the latter company's refrigerators is the quick release ice tray; they were also one of the first to introduce automatic interior lighting. The combination of refrigerators with other equipment has not made a great deal of headway, but Coldair, Ltd., are finding their combined sink and refrigerator a good selling point with builders, and the Pressed Steel Company is continuing its "Prestcold" combined cooker and refrigerator—the cooker being placed above the refrigerator. Both companies market standard models as well.

There are few features of the Marco range, apart from the



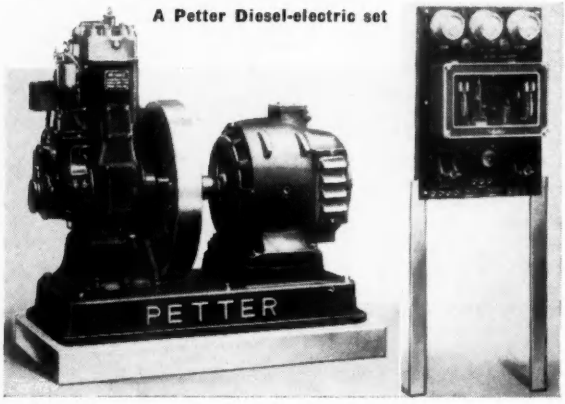
Three newcomers: An H.M.V. "Streamline" refrigerator, the Sykes & Dyson "Reliance," and the new Electrolux built-in model (M.1.)

Other Useful Appliances

Various devices for the house, garage and garden

In the foregoing articles we have dealt with the electrical equipment which falls definitely into broad classes. But the name of the rest of the appliances available is legion, and all we can do is to mention a few typical examples of these. They may be considered to add finishing touches to the all-electric home.

APART from adjustable bathroom fires, such as the Ferranti, Reyrolle, and Rowlands bowl, which are specially designed from the safety point of view for mounting on the wall or ceiling where they are out of reach, toilet accessories include the Siemens-Schuckert "Siroma" electric razor, priced at 25s. and operated by an ordinary 4.5-V pocket lamp type of dry battery connected by a flexible lead to the handle. Otherwise it is similar in appearance to a normal safety razor,

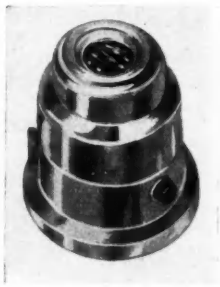


A Petter Diesel-electric set

the handle containing a tiny motor that imparts a scythe-like motion to the blade, which oscillates at the rate of about 100 times per second and may be of any of the ordinary makes available.

Loaded at 300 W and listed at 27s. 6d., the G.E.C. chromium-plated copper shaving pot with detachable lid will boil half a pint of water in three minutes. Among different designs of illuminated shaving mirrors the Hawkins is in the form of a disc with a rear lamp shining through a lens at the bottom. Plain or magnifying, it is available as a table standard, with several types for wall mounting, including an expanding arm, and also in a travelling case at from 25s. to £7.

The "Hotpoint" is similar, but the Melvin models do not need a special lamp; they are of the circular box pattern, 10 in. in diameter and 3.5 in. deep, listed at 17s. 6d. and 21s. with a shock-proof push-bar switch, the heat from the lamp keeping the plate glass mirror "mist-less"; the lower quarter is cut off for the exit of the light.



The Dowsing cigarette lighter

The "Fractional" motor-driven hair clipper is claimed to be the first of British manufacture, and is enclosed in a bakelite housing.

For heating hair-curling irons the Calvete stove is fitted with a refractory element and a two-heat rotary switch; it is priced at £1 13s. and will accommodate two pairs of tongs at once. The General Electric Co., Ltd., makes a single 80-W heater listed at £1 17s. 6d., with a tumbler switch. The Hawkins all-electric curling iron does not require a separate heater; it is obtainable for 15s. in four different colours, the loading is 20 W and a convenient form of thumb switch is provided in the handle.

The available selection of hair dryers is large. A single rotary switch controls both the universal motor driving the fan and the element for heating the air stream, all-insulated models being preferable to metal casings. The Hawkins has a 50-W motor and a 500-W element; the coloured bakelite models cost 33s., while the chromium-plated ones cost a little extra.

Refrigeration Developments (*continued from previous page*)

broom-high legs, which differ from standard practice, the company having concentrated on producing a reliable high quality machine of an orthodox and well-tried design. The compressor is enclosed and situated above the cabinet.

What is, we believe, the only refrigerator with an oak exterior is the Leda 11½ cu. ft. table service cabinet, relatively a newcomer which has proved very popular. Ten freezing speeds are provided by the Sykes & Dyson "Reliance" refrigerator; there is 5½ cu. ft. capacity and the compressor is situated above the cabinet. The "Sparton" is sold by Drake & Gorham Wholesale, Ltd., and the "Crossley Shelvador" by A. J. Balcombe: both are American productions.

Taking a general view of the information which our representative was given by various manufacturers it appears that, apart from the £19 10s. "Electrolux Minor," the most popular size is about 5 to 6 cu. ft., while it is apparent that the smaller the family the greater the demand for a refrigerator.

We were interested in the story that one manufacturer told us of the housewife who took her food out of the refrigerator one night because the weather was frosty, only to find it frozen hard in the morning. Which goes to show that the refrigerator can be used in the winter to *prevent* the freezing of food.

Illustrated below is a group of the more unusual types of refrigerators referred to in the foregoing article.

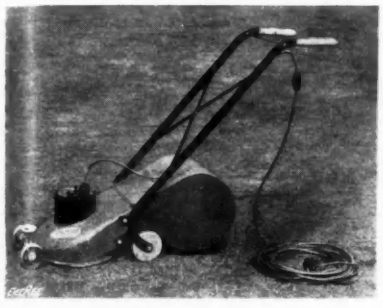
An example of the "table-top" construction is the Coldair, although Orme, Evans & Co., Ltd., make a similar type of refrigerator having a cubic capacity of 4½ cu. ft. and costing 33 gn. in addition to a range of orthodox design. The Coldair has 5 cu. ft. of storage space and costs £42, with a large vegetable bin measuring 3 ft. high, 4 ft. wide and 2 ft. deep, above the compressor.

The same company's built-in model is yet another example of the move the refrigerator manufacturers are making to co-operate with the builders, while the hotplates of the "Prestcold" combined cooker and refrigerator can clearly be seen on the top of the cabinet. The cooker switches are situated beside the oven at the top. In contrast to these unusual types is shown a standard type of refrigerator manufactured by Kelvinator, Ltd.

The "Kelvinator"; the "Prestcold" combination; and the "Coldair" table and built-in models

Other "extras" are an adjustable table stand and a deodorising attachment.

The 650-W G.E.C. dryer (39s. 6d.) has a case of brown bakelite reinforced with fabric, and a table stand can be supplied. The Rawlings (32s. 6d.) has a moulded bakelite case, while the several Calvete models include floor standards and a new departure in the form of an exceptionally large disc-type aperture for the heated air stream in place of the usual nozzle, listed at £2 15s. The coloured bakelite Cooper-Stewart is one of the smallest and lightest; it costs 32s. 6d., measures 8 in. overall and weighs 28 oz. On one side of the casing is a mirror and on the other two tumbler switches, so that the heater cannot be switched on before the motor is started.



The "Rotoscythe" grass cutter

The Hawkins clothes restorer, which fits into the normal trousers press and helps to make a lasting crease, is loaded to 350 W and listed at 18s. 6d.; a tie iron for insertion between the linings is sold for 7s. 6d.

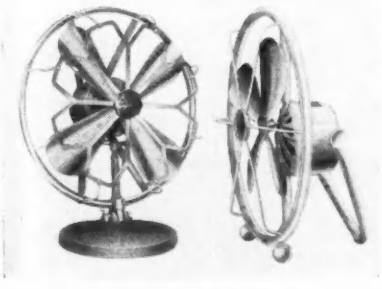
The choice of electric towel rails is quite wide. Among them the Low wall bracket pattern is 30 in. long, 7 in. high, and projects 5 in. Loaded at 50 W and priced at 28s., it has white porcelain enamel ends and plated rails above and below the single tubular heater with which the rail is equipped

An earthing terminal is provided and a guard fitted over the 200-W element of the G.E.C. models, the wall bracket being listed at £2 18s. and the floor standard at £5 15s. A 300-W model is made by the Waring Tube Heating Co., Ltd., and Messrs. Geo. Nobbs & Co., Ltd., have a "Genii" towel rail with the actual rails and supports hexagonal in shape—an unusual design.

Electric Fans

Apart from the built-in variety for extraction through a hole in the wall, such as the "Midland" propeller pattern, motor-driven fans for household use are usually table standards or of the bracket type for wall mounting, but they are occasionally suspended from the ceiling. Prices range upward from about 40s. and loadings from 30 W, among the smallest being the Siemens fan and the 30s. Sun model equipped with 8 in. blades.

Many makes are obtainable in polished metal, plated, and enamel finishes, the metal blades being enclosed in a wire cage, but the B.T.H.-Hotpoint "Bandolero" needs no guard since three loops of specially woven fabric are used instead of blades, which are harmless if accidentally touched. The housing is made entirely of moulded bakelite and is arranged for wall mounting or with a tilting arm for table use. The price is 25s., and a radio anti-interference device can be fitted



Gilbert and Sun fans

The Gilbert fan guard and pedestal to which it is directly attached are of uncommon design. A simple push back or pull forward provides self-adjustment of angle without screws, and the "float" suspension of the motor minimises vibration.

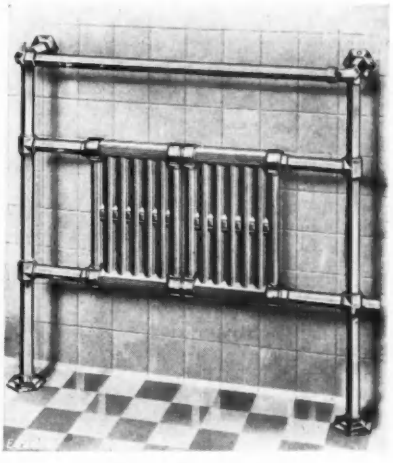
The swivel and trunnion movement employed in the General Electric Co.'s fan enables the direction of air disturbance to be altered, and a two-speed and "off" switch is fitted in common with Veritys, Revo, and other well-known makes. The "Wyndo" fan (Crittall Ventilator Co.), which was described in our last issue (page 484) is made to fit into a window pane.

An English Electric fractional h.p. motor

The Kent dish-washing machine is sold at from £35 upward, 1 kW sufficing for over forty operations. Specially shaped wire-mesh baskets are provided into which the crockery is packed upright and placed in the upper circular tank. A motor pump then sprays water from all directions on to the contents, the force of the jets causing the carriers to rotate. This provides a scouring action which cleans the crockery in a very effective manner.

The water is lifted from and returns to a lower tank which is divided for hot washing and cold rinsing water, a lever-operated change-over cock being provided. Drainage is through filters that trap refuse and immersion heaters may be fitted or the tanks can be connected direct to the domestic hot and cold water supply pipes.

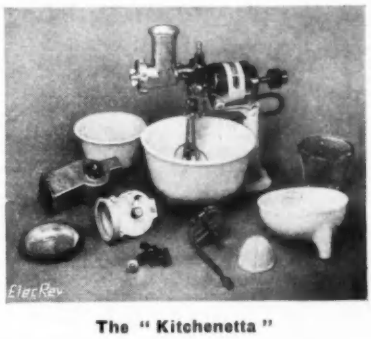
The Hawkins "Culinaire" is an exceedingly useful time saver. A miniature motor enclosed in the base drives a vertical shaft which extends upward through the base of the container bowl. Variously shaped tools fixed to the shaft will mix, beat, mash, extract fruit juice, slice and shred, chop and mince meat, &c. The outfit is listed at £6 10s. with numerous attachments as extras.



The "Genii" towel rail

The horizontal tilting Gilbert machine, priced at £5 19s. 6d., will perform similar operations as well as grind coffee, crush ice, sharpen knives, and open tins, while smaller motor driven mixers and juice extractors are listed at from 25s. to 90s.

Well-known makes of sewing machine motors with foot pedal controllers are the Singer, rectangular Klaxon and Hawkins models, and the flat-sided 60-W G.E.C., which sells at £4 17s. 6d. with 25s. extra equipped with a five-speed pedal switch. These machines are usually universal for standard voltage ranges, whereas small motors suitable for driving domestic appliances are obtainable for d.c. and for a.c. in several single- and three-phase types as well as for universal application. Prices range from 20s. and powers from 1/1,000 h.p. upward in the case of "fractional" machines. Other established makes include the B.T.H., Higgs, S.F.P., "Klaxon," G.E.C., Normand, B.K.B., Cook, Power Specialities and English Electric. Some sizes are supplied with speed reduction gearing incorporated as part of the motor housing



The "Kitchenetta"

Garage and Garden Appliances

Small metal tube heaters with a hook at one end for hanging inside motor-car radiators to prevent the water freezing in cold weather, which may also conveniently be used for heating linen cupboards, are available with loadings of from 50 to 150 W and up to 1,000 W for floor or wall mounting. Prices range from 6s. (Rowlands's) up to 17s. 6d., the Green and G.E.C. having three-core connectors to facilitate earthing. The cheapest Hawkins model is 9s. 9d., and for 21s. a combined heater and inspection lamp in a wire cage with change-over switch is obtainable.

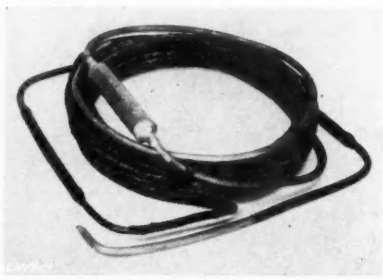
For the garden, "Church" forcing and propagating frames are specially designed for electric heating with automatic tem-

perature control. Tubular air heaters for keeping frost out of cold frames are also supplied, and small electric boilers for circulating hot water through greenhouse pipes under thermostatic control, besides water heaters for taking the chill off before spraying plants.

G.E.C. equipment for similar uses is obtainable as well as soil-heating cable for burying direct in the ground. This cable is also manufactured by Callender's and Siemens Bros., the last-mentioned including a recently introduced variety in which a new "Sun-Vic" thermostat of very small dimensions is built into the cable itself instead of being connected externally as an accessory.

"Tunnel" heaters are made by Messrs. Bertram Thomas with loadings of from 60 to 240 W per foot run, a single steel casing being employed for each rating. The elements are contained in a neat rectangular casing with removable top cover, replacing the more usual bank of pipes and multiway brackets.

The "Church-Ray" a.c. lawn mower consumes about 0.25 kWh per hour and is priced at £17 10s. Ransomes grass-cutters are listed at from £27 10s. in powers of 0.5 and 0.75 h.p., the motor which rotates the cutting knives also propelling the machine. Priced at £9 9s., the Power Specialities mower has horizontal blades rotating with a scythe action, at the same time creating an upward draught that sucks the cut grass into a basket. It is known as the "Rotoscythe."

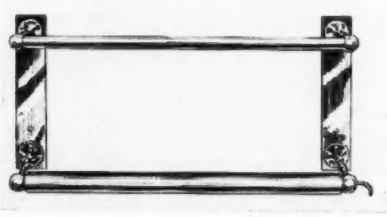


The Siemens soil-heating cable with a "Sun-Vic" thermostat

The Harrison hedge-cutting machine weighs 6 lb. and is driven by a 0.25-h.p. a.c. motor, the clipping action being produced by a blade oscillating against a comb.

Langton garden fountains are self-contained, selling at from £9 10s. and operated by a centrifugal motor-driven pump loaded at 60 W. Marelli 1-in. type "PIV" centrifugal pumping sets are specially designed for domestic and country house services with an overhung a.c. or d.c. motor built into the pump bedplate, delivering from 198 to 330 gallons per hour, the loadings ranging from 290 to 680 W.

Little room is needed for the installation of goods and service lifts in private houses—about 2 ft. 6 in. square. They can be automatically operated by push-button control and can be supplied at a small enough first cost to warrant more attention being given to their use. Messrs. Marryat's new designs incorporate several improvements, and Messrs. Pickering's claim very low running and maintenance costs for domestic lift equipment installations.

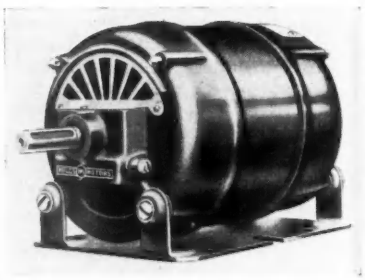


A Waring towel heater

Among the most recent developments of small electric light and power plants for country houses is the Petter cold-starting "Atomic" Diesel engine directly connected to an electric generator working in conjunction with a small storage battery and controlled by automatic switchgear. The small battery takes the load up to about 15 per cent. of the set capacity when the engine starts automatically and current is supplied direct from the dynamo, which at the same time replenishes the battery. The governor operating on the main governor of the fuel injection system maintains a steady and uniform voltage irrespective of the load on the set. On the demand falling off to about 15 per cent. of the full load, the automatic gear again comes into operation, stops the engine, and the supply is then taken from the battery.

An important feature of the automatic engine controls is that when the engine is running at periods other than at starting or stopping, the control coils are not taking current from the battery. This not only ensures long life for the automatic gear, but gives a high overall efficiency. For emergency purposes a simple switch panel connects the set to the mains, either a.c. or d.c., and upon failure of the main supply the set supplies current instantly from the battery and then the engine is automatically started, so that the supply is not restricted to the capacity of the battery. These sets, both for general and emergency purposes, are made in four standard sizes of 2, 3, 4 and 5 kW, whilst larger sizes are designed according to special requirements.

Austinlite, Ltd., markets house-lighting sets from ½ kW, 25 or 32 V, running on petrol and above 3 kW on crude oil, while 1, 1½ and 3-kW sets using water-cooled paraffin engines are made by Crossley Bros., Ltd. A range of self-contained generating equipment includes wind-driven sets in various sizes up to several kW. Automatic models with an output of 800 W at 110 V d.c. with a 1¾-h.p. air-cooled engine are included in a range made by the Kohler Co., Ltd. A 4½-kW plant is made by R. A. Lister & Co. Kryn & Lahy (1928), Ltd., make engines suitable for driving electric generators, Newtons of Taunton, Ltd., manufacture complete generating sets available in nine sizes of from ½ kW to 24 kW (2¼ h.p. to 36 h.p.) for direct lighting or for use with stationary batteries. The engine operates on waste oil mixed with crude oil and a special device enables the engine to be started from cold in about one minute. It is self-governing. Stuart Turner, Ltd., and Tangyes, Ltd., also make self-contained sets of one to four h.p., the latter company employing a two-stroke petrol engine.



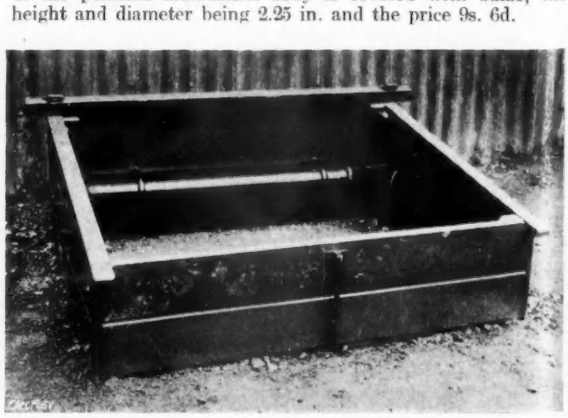
A Higgs motor

"Three-fold" self-contained electric pumps priced at £16 10s., with a delivery capacity of 250 gallons per hour, are sold by R. A. Lister & Co. A ¼-h.p. a.c. or d.c. motor is mounted directly to the pump housing and driving is by an endless V-belt.

Henley's "Solon" soldering iron is sold for 7s. 6d. complete with resin-cored solder, 6 ft. of flex, and an adaptor for plugging into an ordinary lamp-holder. It can be used for over 15 hours for 1 kWh. The 65-W element is built up on mica formers inside the bit, and clamped in intimate contact with it in such a way that the heat is directly conducted to the bit without dissipation through air space.

The Langton garden fountain

A new Dowsing line is an electrically heated cigar and cigarette lighter, fitted with an easily replaced 90-W element and a press switch. The base of the polished aluminium body is covered with baize, the height and diameter being 2.25 in. and the price 9s. 6d.



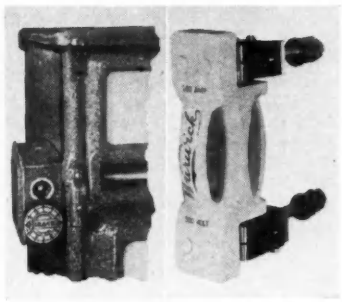
A Church electrically heated garden frame

Wiring Materials and Accessories

Some recent developments

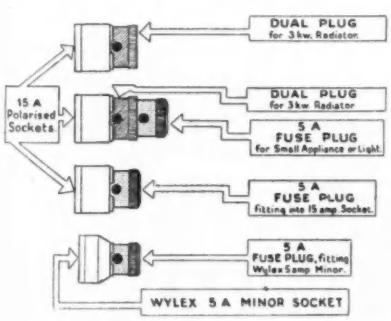
The recent publication of a new edition of the I.E.E. Wiring Regulations is a reminder that the soundness of the installation is as important as the reliability of appliances.

IT is unfortunate that price has been the main consideration for some time in the development of socket outlets and plugs, and, whilst in the majority of cases compliance with the British Standard Specification has been aimed at, many plugs and sockets employed to-day would prove wanting if the micrometer were used on them. The new I.E.E. Regulations, with the demand for safety features, and the new B.S.S. No. 546, should help to eliminate the doubtful, and in the meantime all the ingenuity of designers is wanted to meet the requirements.



A "Thermentor" fitted to a modern cooker
Warwick self-aligning H.O. fuse

We have heard it said that the Specification is too exacting for manufacturers to comply with in all respects without radically changing existing designs. We notice, however, that M.K. Electric, Ltd., has already produced a B.S.S. 546 unit, the outstanding feature of which is the very much larger socket base cover to prevent overhang. The base interior seems to be much the same, but to reduce dimensions the base cover is approximately square and the plug is nearly triangular. Overhang prevention is also one of the two distinctive features of the recently modified two-pin and earth multi-way plug adaptor produced by Messrs. A. P. Lundberg & Sons, Ltd.

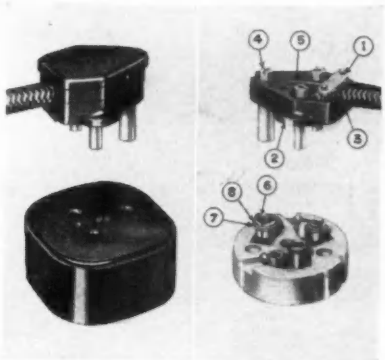


The "Wylex" plug system designed to afford adequacy with safety

Polarisation and safety are, of course, very closely allied, and it is obvious that many manufacturers are more concerned with safety than with B.S. recommendations. Such an observation seems to focus attention on several forms of interlocked switchplug, the designs of which have been based almost exclusively on safety, with the result that they appear to be outside the B.S. range. Talking about the "H.B." switch-plug, Mr. A. C. Wynne (Messrs. Henley, Burrowes & Co.) said that the design of this unit, with its quadruple break, giving complete isolation of the socket contacts on both poles, together with the fuller insulated pins, is recognised as giving complete immunity from risk.

Improvements incorporated in the "Automatic" switch-plug made by the Wandsworth Electrical Mfg. Co., Ltd., include the tunnel-entry plug and shrouds for flush patterns. M.K. Electric, Ltd., considers that the interlocking switch-plug is still the favourite and the safest equipment. The extra cost is not much, but the extra safety is beyond doubt. It pointed out that its 15-A interlocking unit would take an ordinary B.S. plug.

The "Wylex" switch-plug, which is manufactured by Messrs. George H. Scholes & Co., Ltd., reminds us of the lively flat- *versus* round-pin correspondence in the ELECTRICAL REVIEW a short time ago. Messrs. Scholes say that, because the I.E.E. Regulations recommend standard plugs and sockets, some engineers have been in doubt as to whether they would be in order in accepting or using "Wylex" plug installations. But, so long as an installation is safe and not likely to cause danger, an undertaking is not justified in refusing a supply.

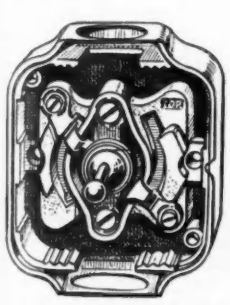


"M.K" 3-pin plug made to comply with B.S.S. No. 546
1. Adjustable cable grip. 2. Finger guards. 3. "Bell mouth" entry. 4. "Flat" terminals. 5. Located conductors. 6. Spring grip sockets—springy phosphor bronze. 7. Solid ring. 8. Pressure ring.

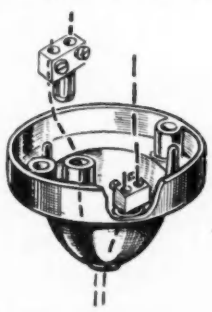
The "Wylex" plug is part of the P.W. "all-in" system which is designed to permit the use of the maximum number of appliances in a house. There is a 15-A socket for radiators and a 5-A "Minor" socket for cases in which heaters are not wanted. A "Dual" plug connected to each radiator flexible and a 5-A fused plug on each small appliance completes the system. The fused plug will fit both the "Minor" and "Dual" sockets, but not the 15-A socket, and the "Dual" socket will fit only the 15-A socket.

1. Crabtree H.O. skirted lampholder. 2. The H.B. switch-plug. 3. The Iddon lampholder cord grip. 4. Drayton high-load thermostatic room switch

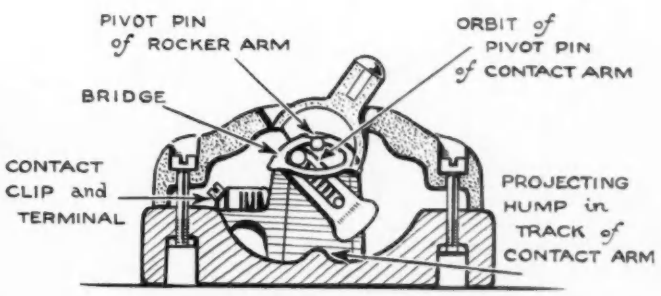
There is a somewhat similar "Wandsworth" scheme. A



The "Tenbyluxe" switch

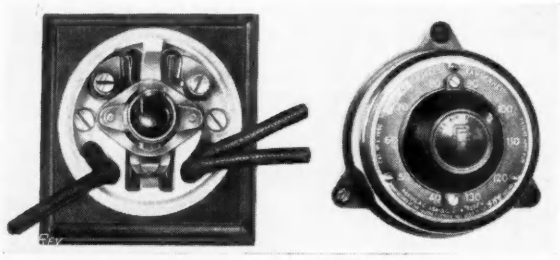


A one-piece ceiling rose (Moulded Accessories)



Section through the "New Titan" shockproof switch

fused switch-plug top is available for 10-A sockets, and fused adaptors for 15-A sockets. One adaptor will take a three-pin B.S. plug top, and another will take a 10-A switch-plug top, thus providing for interchangeability between the 10-A and 15-A sizes. A fused M.K. adaptor provides a controlled outlet for clocks, radio, etc., and is specially shaped to avoid confusion with non-fused plugs. The 15-A size enables small



A "G.E.C." lighting switch with front connection terminals and Salford air-type thermostat

appliances to be plugged into 15-A sockets with both the appliance and flexible cable protected by 5-A d.p. fuses.

The G.E.C. points out that while a switch may not now necessarily be employed to control the socket outlet, it is necessary for one element of the radiator to be uncontrolled by a switch on the apparatus itself, so that if an uncontrolled outlet is employed, the plug must be withdrawn to operate the uncontrolled element on the fire. Mr. Mills, of M.K. Electric, wishes to know how we can talk about the flexibility of electricity when we have to stoop and put a plug in.

A 15-A switch-plug produced by Messrs. George Becker, Ltd., has a steel-centred dolly which permits kicking "on" and "off." The top-plug or side-switch switch-plug also made by this company certainly represents an advance in manipulation on the side-plug unit. In the "Efesca Ace" non-interlocking switch-plug marketed by Messrs. Falk, Stadelmann & Co., Ltd., the switch terminals, socket-tube, and plug-pin terminals are clearly marked "E," "N," and "L."

An advantage claimed by Lectrolinx, Ltd., for the "Clix" plug is that the resilience of the pins is guaranteed indefinitely against collapse, and that this guarantee is possible by reason of the design of the pins, and does not rely upon the flexibility of the metal, as is often the case.

Compare these switching arrangements on an earlier Jackson cooker with those of the 94J shown on page 519

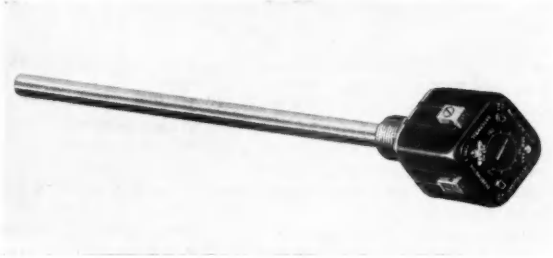
The introduction of multi-way plugs occasioned much displeasure, but business in them continues to extend. There is the tier idea adopted by Santon, Ltd., and the plug unit equipped with more than one separate socket unit, such as the "Grelco" adaptor produced by the Grafton Electric Co. Santon's have a 15-A to 5-A reducing plug and both fused and unfused 5-A plugs. Bean-shaped plugs are designed for use with side-entry tumbler-type switch-plugs. The angle of the branch socket of the "Grelco" unit is such as to allow the use of round plugs without fouling. The 15-A unit has 15-A and 5-A sockets.

Demands for complete and efficient earthing remind us of the equipment produced by Messrs. A. Reyrolle & Co., Ltd. They stress the permanently resilient contact provided by their self-adjusting socket contact tubes and by scraping tongues forming an improved earthing connection. The outer ends of the "Ever True" plug pins are so shaped as to prevent the slots closing up. A 3-5-A two-pin cast brass watertight socket and plug made by Messrs. Wm. McGeoch & Co., Ltd., has holes in the base for back wiring, and both this and a 10-A three-pin plug of similar construction have a screw-on cap. Crabtree's refer to the trend during the last twelve months towards the 2-A outlet, and since the new I.E.E. Regulations permit such loading in lighting circuits no doubt the demand for these outlets of a very convenient size will increase.

Closely allied to the apparatus plug is the appliance adaptor. The "Anka" made by Callender's Cable & Construction Co., Ltd., particularly for use with "Ankaflex," has special provision for attaching the "Anka" cord strengtheners. It is made of high-grade heat-resisting bakelite, is well ventilated and has no loose parts.

The "Goltone" switch-plug attachment produced by Messrs. Ward & Goldstone, Ltd., has a simple sliding switch with a double-break action, and the company stresses the advantage of the massive vitreous china slider bar. The popular light and heat adaptors are available with both slider and toggle switches, and a good example of each of these is included in the same company's products. The Lundberg union adaptor consists of a b.c. adaptor and a two-pin plug in one. Complete safety from shock is claimed, and the makers say that when the two-part pattern is connected to a lamp-holder it is possible for the plug to be disengaged, so exposing the live pins or contact tubes.

The brass lamp-holder is still with us and will doubtless remain as long as metal lighting fixtures. But in the bakelite unit the number of detachable parts has been reduced to three, and, as the G.E.C. says, the terminals in the latter are more



"Satchwell" type "Z" immersion thermostat

accessible. An example of the simple cord gripping permitted by the bakelite lamp-holder is seen in that produced by Messrs. Victor H. Iddon, Ltd. The grip is inside the cone at the point where the two single cords are separated from each other by an insulating porcelain cone.

Moulded Accessories, Ltd., refer to their lamp-holders as the backbone of their business. The range includes cord-grip, shade-carrier, and H.O. types. The last-mentioned has a full skirt with ventilation holes. In a combined lamp- and shade-holder introduced by Ray Mouldings, Ltd., the movable shade ring is dispensed with, its place being taken by a moulded collar on the lamp-holder section. This carries the shade, and the dome is screwed down from the top over the centre body with the connections.

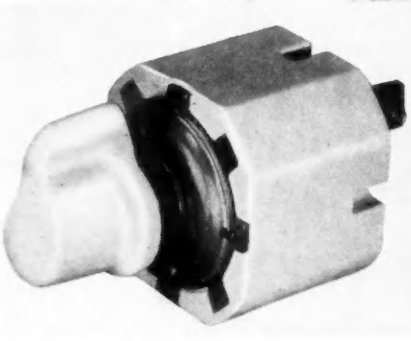
Where there are lamp-holders there are generally ceiling roses, but the influence of bakelite is not quite so marked. The G.E.C. points to an improvement as the result of the use of bakelite in the reduction of the time required for attaching the flexible cord and incorporating pillar-type terminals and efficient cord gripping. The new Moulded Accessories one-piece ceiling rose is designed primarily for quick and simple fixing. Naturally, this simplicity is reflected in the price. Kersons Manufacturing Co., Ltd., say that the Kerson ceiling switch has now almost completely superseded the pear switch for bed-light control. But we are aware of several new pear switches that have been introduced within the last few months.

"Memkuka" cooker control unit

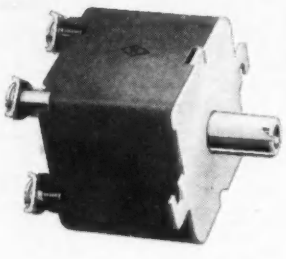
Messrs. J. H. Tucker & Co., Ltd., remind us that tumbler switches can still be easily separated into two main types—the quick-make and quick-break, and the slow-make and quick-break for simple lighting only. They consider that their solid link quick-break and slow-make switch has distinct advantages. Its original fundamental construction is the same, and the exceptionally long break and the long creepage barrier make it suitable for damp situations. It can be operated quite noiselessly. The dolly, of the insulated pattern, incorporates a heavy section reinforcing stem.

Supporting their statement that the accessories section is

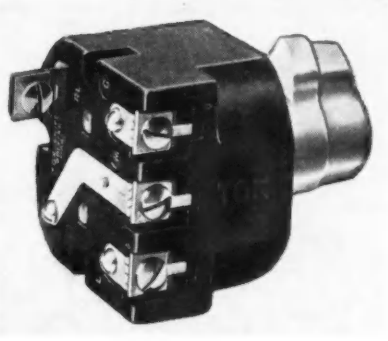
possibly the liveliest in the electrical industry from the point of view of competition, Crabtree's tell us that the listed price of the "Lincoln" shockproof switch has fallen by 35 per cent. during the last five years. This switch has a base diameter of only 2 in., and the makers say that its success has been due to this smaller size and its lower price. It has definitely superseded the old metal alternative for all general purposes.



Arrow cooker switch



Diamond H remote control switch

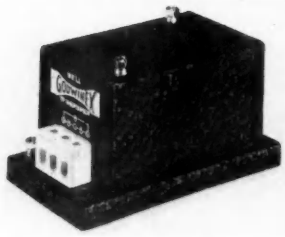


A square base "Kubic" cooker switch (Tok Switches, Ltd.)

The feature of the "Wizard of the Wall" switch produced by Moulded Accessories is that it is just ½ in thick. The movement is entirely enclosed, and it definitely withstands all ordinary tests. The Becker "Corporation" embodies a ball-bearing positive action. A G.E.C. development towards labour cost reduction is the surface switch which can be fixed first and wired afterwards by drawing the wires through a slotted hole in the base and connecting them to front wiring terminals.

Another move towards easy wiring is the "Tenbyluxe" switch developed by Messrs. S. O. Bowker, Ltd. It has a semi-rotary action, is operated by a tumbler-type dolly, and is q.m. and q.b. The porcelain switch proper is fitted in a bakelite box with plenty of working clearance, and the moulded box fits snugly into a metal case. The connections are made before slipping the bakelite box home and securing it in position by two push-over tags. The overall depth is only $\frac{9}{16}$ in., so that it is necessary only to remove the plaster.

Two-way switching is not used so much as it should be. The "Ezilite" dual switch, a development of the Ezilite Switch Co., is a simple outfit, by which such switching can be adopted without altering the normal wiring. The outfit consists of a specially designed tumbler switch, a two-way pear switch, and five yards of three-core flexible cable. The tumbler switch, of course, replaces the switch by the door.



Dyson bell transformer

A new move of the Patent Switch & Fuse Indicator Co., Ltd., is glass switch plates fitted with neon indicators. These plates can be painted on the back to suit any decoration. The shockproof caps which can be supplied with these "Everlight" indicators will fit most makes of switches. A sunk switch with a "Duroid" plate complete is a new "Efesca" development.

The catalogue of Messrs. Julius Sax & Co., Ltd., reminds us that bell and indicator equipment is still one of the most important and specialised sections of the industry. Mains-operated bells and electrical replacement indicators are among modern developments, but we are assured that battery-operated equipment is still holding its ground. Then there is the bell transformer business in which Messrs. J. Dyson & Co., Ltd., specialise. Even bell wire has now to be made to exacting demands, and an example of modern wire is the "Hitest" produced by Falk, Stadelmann. It has a v.i.r. covering and is suitable for all installations where there is a likelihood of dampness. Similarly, "Derbell," a high-quality bell wire obtainable from Messrs. Crompton, Parkinson, Ltd., is suitable for situations where the usual paraffin-waxed wire is likely to be unsatisfactory. The outer coverings of the two cores are of different section, one square and one round, for easy distinction in the dark. "Derrite," sold by the same company, is a c.t.s. cable particularly suitable for buried wiring. The resilient sheathing is highly resistant to moisture acids, etc., and is unaffected by plaster.

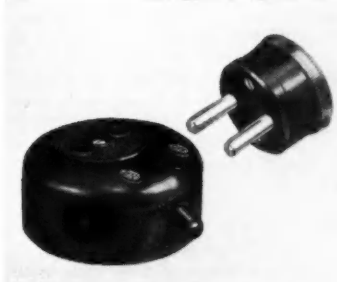
Tough rubber-sheathed cable is the basis of a good many wiring systems to-day, most of which employ bakelite accessories, including one of the three standard Cable Research systems adopted by the members of that organisation, who adapt their own particular make of cables to the agreed form of accessories.

Of the non-standard systems there are the B.I. paper twin wiring system which, with its c.i. compound-filled boxes, forms a miniature underground cabling scheme; the "Lecite" systems of the Liverpool Electric Cable Co., Ltd., which employ cables incorporating an identification strip, and wood capping which can be painted to match decorations; and the "Tenby" (S. O. Bowker) system for l.c. cables, with its simple pressed metal junction boxes and bonding bars. A type of connector similar to that used in the last-mentioned system is the "Scruit," produced by the V.G. Manufacturing Co., Ltd. The conductor ends are bunched, and a connector is screwed on to the bare ends, resulting in a watertight joint.

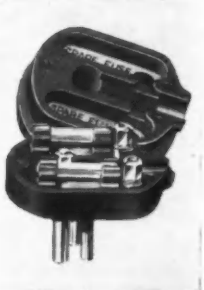
Kinking troubles with flexible cables for appliances have nearly disappeared, due largely to the special efforts made by cable manufacturers. B.I. "Supaflex" for small portable appliances has a smooth, hard-wearing, non-fraying braiding, and the company's "Rockbestos" is specially designed for use with heating appliances and has long-fibred asbestos insulation. Saturated with a chemically neutral compound, "Ankaflex" (Callender's) is a waterproof protected flexible with cord strengtheners for attaching to the adaptor or wall plug to take pulls. "Livaflex" (Liverpool Cable Co.) cords are designed to stand severe abrasion and bending, and the overall braid does not slip back or unravel.

The "Anka" adaptor

The development of insulated wiring systems has had its effect also on main switch- and fuse-gear. The recently introduced Tucker "Titan" 15-A d.p. shockproof switch-fuse has a movement of the robust kind usually associated with iron-clad apparatus. A very effective interlock is obtained by mounting the wing-type operating handle on the hinged front of the case, thus separating it entirely from the switch mechanism when the case is opened.



Becker "top entry" switch plug

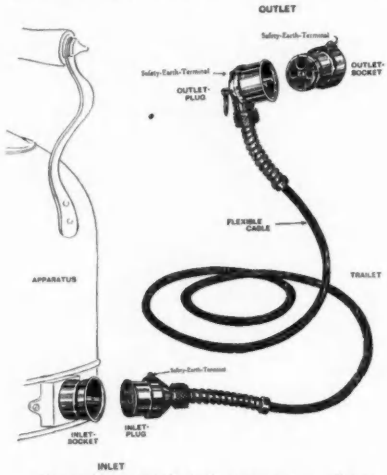


Wandsworth fused switch plug top

The "Memette," produced by the Midland Electric Manufacturing Co., Ltd., is the modern version of the small combined d.p. switch and fuse unit which was introduced first in

ironclad form to eliminate the unsatisfactory arrangement of coupled tumbler switches and bow cut-outs. The present price of this unit is about one-fifth of its initial cost. The "Meminx" is a good example of the "splitter" units which provide complete installation sets for the small house.

The General Electric Co., Ltd., refers to an all-service combination consisting of an iron case with two compartments having interlocking lids. The cover over the fuses can be opened independently for fuse renewals, but the switch cover cannot be opened until the switch is "off" and the cover over the fuses is also opened.



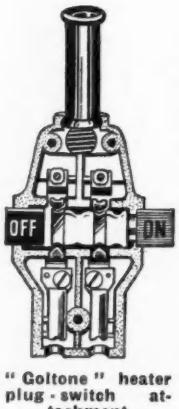
Reyrolle metal-clad apparatus plugs

The Reyrolle all-insulated house-service fuse box deserves particular mention because of its suitability for domestic installations requiring trunk mains. It has three distinct parts—a cable sealing box, a self-aligning fuse and a separately enclosed neutral link. A special feature of the "Warwick" self-aligning fuse (W. McGeoch) is the vibration prevention by means of a small stud engaging in a recess in the fuse contact block.

Two outstanding distribution board developments are the Tucker "Slyp-on" in which the front cover can be entirely removed by placing it in the closed position and sliding it about half an inch to the right (it will slip on just as easily), and the "Lymmit" shockproof fuseboard introduced by Messrs. Faulkner & Co. (Manchester), Ltd., which employs definite-sized cartridge fuses which slip into the hinged fuse bridges. It is impossible to insert in a bridge a larger cartridge than the size for which the bridge is designed.

Miniature circuit breakers have not made much headway in the domestic field, presumably on account of initial cost. A typical example is the "Dwarf" produced by Salford Electrical Instruments, Ltd. The mechanism is electromagnetic and comprises a hand-closed contact arm held in by a latch which can easily be tripped by the operation of an armature attracted by a coil carrying the line current.

The latest move in cooker control units is the incorporation of a change-over switch which provides a supply to water-heating equipment at times when the cooker is not in use. Reyrolle's and M.K., Ltd., produce good examples of these units.



"Goltone" heater plug-switch attachment

The development of the cooker switch has always been a little obscure, partly because of the secrecy adopted in the early days. Diamond H Switches, Ltd., tell us that up to about 1921 cooker manufacturers had only one type of switch to select from, the round base surface unit with clockwise action, fitted with an insulation-lined metal cover. In 1927 the first serious attempt at flush mounting was made, and surface switches, without covers, were mounted flush on a sub-panel or straps, heat indications being moulded on the cooker front. In 1929 came the company's first flush mounted, side connected, offset neutral terminal switch, which, because of its reduced dimensions, enabled cooker makers to either increase their oven sizes or reduce their cooker frame widths. Further, the offset neutral terminal brought about the adoption of bus-bar connections, with consequent reduction in wiring and servicing costs. A little later the company introduced its first remote-control rod with a specially designed switch by which complicated assembly has been reduced, and now a new rod has been produced which still further lowers costs.

Arrow Switches, Ltd., attribute a great deal of the successful performance of their product to the complete accuracy of the porcelain as well as of all the metal parts. The success of the cam mechanism is due largely to its simplicity. An exclusive feature is the spindle and arrow reciprocating action. The spring is constructed of high-tempered steel wire.

The "Kubic" cooker switch produced by Tok Switches, Ltd., is a three-heat series-parallel reciprocating rotary unit with a 2½-in. square base. The cubic design allows any number of switches to be mounted in line close together. The company draws particular attention to its special fireproof cover.

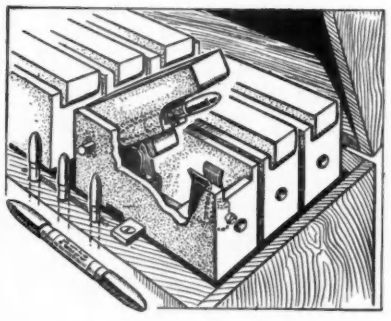
Automatic cooker oven control is being well received. The "Thermentor," produced by the Igranic Electric Co., Ltd., operates within close limits by a metallic thermostat, and the neat switch and indicator in an enamelled case may be externally attached to the cooker or built into the casing. The switch has two heavy silver contacts which close with a pressure of 16 lb. per sq. in. The new "Diamond H" oven thermostat is a direct break unit. We are all more familiar with room- and water-heating thermostats. The recently introduced "Satchwell Z" immersion thermostat (Rheostatic Co., Ltd.) is notable for its very small head.

Bakelite is used extensively for accessories (Clang, Ltd.)

The "Satchwell N" room-thermometer will take up to 15 A a.c., while the "K" room-thermostat will take up to 1 A a.c. Intended primarily for use with the "K" thermostat are motorised butterfly valves operated by a very simple and robust a.c. motor driving through gearing. The Drayton Regulator & Instrument Co., Ltd., has developed a new thermostatic room switch which will handle loads up to 20 A direct.

The high-pressure stop valve for magnetic temperature control recently introduced by the Magnetic Valve Co., Ltd., is of the shut-off type, and it will operate against pressures varying from 3 to 250 lb. per sq. in.

There are two directions in which time switches are definitely of domestic value, the control of hall lighting, for which special models have been produced, and for apparatus used for load discrimination, which is generally the same as the industrial type of equipment. Such names as Venner Time Switches, Ltd., the Horstmann Gear Co., Ltd., A.E.G. Electric Co., Ltd., and A. Vandam & Co., Ltd., are associated with the industrial type of equipment, but there is also an attractive Venner hall lighting switch. The latest development of the Stanley Electrical Co. is a mercury tube time switch which will carry 25 A at 250 V, a.c. or d.c.


Safety features of the "Lymmit" fuse board (Faulkner & Co.)

The Salford corridor switch is designed to switch off a light after a predetermined short period, and it will replace an ordinary tumbler switch. It has air dash-pot control. Reyrolle's "Reyvaux" system depends for its operation upon the use of an ingenious bi-metal relay which is capable of being set to trip at various load values.

Normally, one hears very little about the heating materials used by apparatus manufacturers. Typical of these are "Brightray" and "Glowray," produced by Messrs. H. Wiggin & Co., Ltd. "Brightray" has 80 per cent. nickel and 20 per cent chromium. It is suitable for the elements of cookers and fires, etc. "Glowray," which has 65 per cent. nickel, 15 per cent. chromium, and 20 per cent. iron, is satisfactory for all forms of contact heating—for instance, in electric irons.

One reason for the general downward trend in price of electrical appliances has been the introduction of spray finishes. The makers of "Foochow" oriental lacquers, Messrs. Donald Macpherson & Co., Ltd., tell us that synthetic finishes result in reduced production costs because one stoving only is required for two or three coats.

Index to Manufacturers

Giving names and addresses of firms mentioned in the foregoing articles

Abingdon Works, Ltd., Abingdon, Berks.
Acelite, Ltd., Halesowen, near Birmingham.
A.E.G. Electric Co., Ltd., 131, Victoria St., S.W.1.
Aidas Electric, Ltd., St. Leonard's Rd., Willesden Junction, N.W.10.
Aladdin Industries, Greenford, Middlesex.
Allen, E., & Sons, Ltd., St. John's Rd., Summerhill, Tipton, Staffs.
Alneco, Ltd., 229, Brearley St., Birmingham, 19.
Arora Co., Loughborough.
Arrow Electric Switches, Ltd., Newton Works, Tottenham Court Rd., W.1.
Artic Fuse & Electrical Mfg. Co., Ltd., Birtley, Co. Durham.
Auto-Maid Vacuum Cleaner Co., 62, Blandford St., W.1.
Automatic Utilities, Ltd., 134, Uxbridge Rd., Hanwell, N.7.

Balcombe, A. J., Ltd., 52, Tabernacle St., E.C.2.
Becker, G., Ltd., Exhibition Grounds, Wembley, Middlesex.
Bell Fireplace Co., Kingswell Works, Northampton.
Belling & Co., Bridge Works, Southbury Rd., Enfield.
Benham & Sons, Ltd., 66, Wigmore St., W.1.
Benjamin Electric, Ltd., Brantwood Works, Tariff Rd., Tottenham, N.17.
Berkeley & Young, Ltd., Tyseley, Birmingham.
Berry's Electric, Ltd., 85, Newman St., Oxford St., W.1.
Bertram Thomas, Worsley St., Hulme, Manchester, 15.
Best & Lloyd, Ltd., Handsworth, Birmingham.
B. K. B. Electric Motors, Ltd., 200, High Holborn, W.C.
Bobin, Maurice, 15, Farringdon Av., E.C.4.
Bowden Bros., Ltd., Grand Buildings, Trafalgar Sq., W.C.2.
Bowker, S. O., Ltd., 20, Branston St., Birmingham.
Bray, Geo., & Co., Ltd., Leeds.
British Development Co., 79, Petty France, Westminster, S.W.1.
British Electric Domestic Appliances, Ltd., 3, Hanover Court, E.C.2.
British Electric Meters, Ltd., Morden Rd., Mitcham.
British Electrical Equipment Co., Ltd., 12, Norfolk St., W.C.2.
British Hanovia Quartz Lamp Co., Ltd., Slough.
British Insulated Cables, Prescot, Lancs.
British National Electrics, Mossend, Lanarkshire.
British Quain Sunlight, 14, Queen's Rd., Bayswater, W.2.
British Sangamo Co., Ltd., Cambridge Arterial Rd., Enfield.
British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.
British Vacuum Cleaner & Engineering Co., Ltd., London, S.W.6.
Brown Bros., Ltd., Great Eastern St., E.C.2.
Bruce Peebles & Co., Ltd., Edinburgh.
Bulle Co., Ltd., 187, Tottenham Court Rd., W.1.
Bulpitt & Sons, Ltd., Swansea Works, Birmingham, 1.
Burnley Components, Ltd., Rose Grove, Burnley.

Cable Research, Silver St., W.C.1.
Callender's Cable and Construction Co., Ltd., Victoria Embankment, E.C.4.
Calvete, I., Ltd., 59, North St., Clapham, S.W.4.
Carron Company, Carron, Falkirk.
C.C.A. (Vacuum Cleaners), Ltd., 138, Lever St., E.C.1.
Church, H., & Co. (Essex), Ltd., Queen St., Chelmsford.
Clang, Ltd., Crown Yard, Cricklewood, N.W.2.
Coldair, Ltd., North Circular Rd., Willesden, N.W.
Cook, J., & Sons, 126, Aldersgate St., E.C.1.
Cooper-Stewart Engineering Co., Ltd., 136, Long Acre, W.C.2.
Courtney, Russell & Co., Ltd., 31, Fitzroy Sq., W.1.
Crabtree, J. A., & Co., Ltd., Lincoln Works, Walsall.
Crompton Parkinson, Ltd., Bush House, W.C.2.
Crossley Brothers, Openshaw, Manchester.

Diamond H. Switches, Ltd., Gunnersbury Av., W.4.
Domestic Electrification, Ltd., 85, New Bond St., W.1.
Dowsing Radiant Heat Co., Ltd., Bollo Lane, W.3.
Drake and Gorham Wholesale, Ltd., 77, Long Acre, W.C.2.
Drayton Regulator & Instrument Co., Ltd., West Drayton.
Dugdale Manufacturing Co., Settle, Yorks.
Dulcetto-Polyphon, Ltd., 2 and 3, Newman St., W.1.
Dulrae Mfg. Co., Ltd., 4, Bloomsbury Place, W.C.1.
Dyson, J., & Co., Ltd., 5, Godwin St., Bradford.

East London Rubber Co., 29-33, Gt. Eastern St., E.C.2.
Eaton Canadian Products (England), Ltd., 28, Mortimer St., W.1.
Edison Swan Electric Co., Ltd., 155, Charing Cross Rd., W.C.2.
Edmundson's Electric Supply Corporation, Broad Sanctuary Chmbrs., S.W.1.
Elcap, Ltd., 1, Lozells Rd., Aston, Birmingham, 19.
Electric Art Shades (1928), Ltd., Feering Factory, Kelvedon.
Electric Cushions, Ltd., 46, Gt. Tichfield St., W.1.
Electrolux, Ltd., 153, Regent St., W.1.
Electroway Heaters, Ltd., Baxter Works, Loughborough.
Empire Trading Co., 90, Victoria St., S.W.1.
English Electric Co., Ltd., Stafford.
Eureka Vacuum Cleaner Co., Ltd., 8, Fisher St., W.C.1.

Falk, Stadelmann & Co., Ltd., 83, Farringdon Rd., E.C.1.
Falkirk Iron Co., Ltd., Falkirk.
Faulkner & Co., 6, Marriott Court, Manchester.
Ferranti, Ltd., Hollinwood, Lancs.
Fractional H.P. Motors, Ltd., West Heath Works, Rookery Way, N.W.9.
Frigidaire, Ltd., Edgware Rd., N.W.9.
Froy, W., N., & Sons, Ltd., Brunswick Works, Hammersmith, W.6.
Furn Art, Ltd., Sarnesfield Rd., Enfield.

Galsworthy, Ltd., 16, Newman St., W.1.
General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.
General Radiological & Surgical Apparatus Co., Ltd., 204, Great Portland St., W.1.
Gent & Co., Ltd., Faraday Works, Leicester.
Geyser Mfg. Co. (1932), Ltd., 1, Goodwin St., Fonthill Rd., N.4.
Gilbert, A. C., & Co., 109, Kingsway, W.C.2.
Gillett & Johnston, Ltd., Croydon.
Girlings, Ltd., Electricity Works, Maldon.
Glasgow Elec. Engineering Co., Ltd., 45, Pitt St., Glasgow.
Glover, W., T., & Co., Ltd., Trafford Park, Manchester.
Grafton Electric Co., 54, Grafton St., Tottenham Court Rd., W.1.
Green, Geo., & Co., "Gee-Gee" Works, Chapel Rd., S.E.27.
Greene, Phillips & Co., 45, Berners St., W.1.
G.V.D. Illuminators, Aldwych House, W.C.2.

Hague & McKenzie, Sloan St., Parade, Birmingham.
Harcourts, Ltd., 21a, Newman St., Oxford St., W.1.
Harrison, J., & Co., Ltd., Cunard Buildings, Liverpool.
Hart Foundry Co., Ryland St., Birmingham.
Hawkins, L. G., & Co., Ltd., 30, Drury Lane, W.C.2.
Henley, Burrowes, & Co., Hudson's Drive, Cotteridge, Birmingham.
Henley's (W. T.) Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.
Higgs Motors, Ltd., Witton, Birmingham.
H.M.V. Domestic Appliances, Ltd., 363, Oxford St., W.1.
Homefyre, Ltd., 45, Tanner St., S.E.1.
Hoover, Ltd., Perivale, Middlesex.
Horstmann Gear Co., Ltd., Newbridge Works, Bath.
Hotpoint Electric Appliance Co., Ltd., 24, Newman St., W.1.
Hounslow, C., & Co., 96a, Coleridge St., Hove.
Household Appliances, Ltd., 85, Cromwell Rd., S.W.7.

Iddon, V. H., Ltd., 27, Blackfriars St., Manchester.
Igranic Electric Co., Ltd., 147, Queen Victoria St., E.C.4.
International Refrigerator Co., Ltd., 169, Regent St., W.1.

Jackson Boilers, Ltd., Vulcan Works, Shafton Lane, Holbeck, Leeds.
Jackson Electric Stove Co., Ltd., 143, Sloane St., S.W.1.
Johnson & Phillips, Ltd., Charlton, S.E.7.

Kelvinator, Ltd., 258, Gray's Inn Rd., W.C.1.
Kent Dish Washing Machine Co., Ltd., Thornton Rd., Croydon.
Kersons Mfg. Co., Ltd., Kingsbury Rd., Minworth, Birmingham.
Klaxon, Ltd., 36, Blandford St., W.1.
Kohler Co., Ltd., 216, Gt. Portland St., W.1.
Kryn & Lahy (1928), Ltd., Coburn Works, Letchworth.
Kubex, Ltd., Swan St., Preston.

Langton, H., & Co., Josephs Rd., Guildford.
Lectro-Linx, Ltd., 79a, Rochester Row, S.W.1.
Leda Electric, Ltd., Oldham Rd., Miles Platting, Manchester.
Lightfoot Refrigeration Co., Ltd., Bush House, W.C.2.
Lister, R. A., & Co., Ltd., Dursley.
Liverpool Electric Cable Co., Ltd., Linacre Lane, Bootle, Liverpool.
London Aluminium Co., Ltd., Westwood Rd., Witton, Birmingham.
Low, Archibald, & Sons, Ltd., Merkland Works, Partick, Glasgow.
Lundberg, A. P., & Sons, Ltd., 477, Liverpool Rd., N.7.

McGeoch, William, & Co., Ltd., 46, Coventry Rd., Birmingham.
McLeod & McLeod, Ltd., 329, High Holborn, W.C.1.
McPherson & Co., Ltd., Knott Mill, Manchester.
Marco Refrigerators, Ltd., 21, Tothill St., S.W.1.
Marelli & Co., Ltd., 19, Garlick Hill, Queen Victoria St., E.C.4.
Marryat & Scott, Ltd., 75, Clerkenwell Rd., E.C.1.
Medical Supply Association, Ltd., 167, Gray's Inn Rd., W.C.1.
Melvin, Ltd., 17, Leighton Place, Kentish Town, N.W.5.
Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.
Midland Electric Mfg. Co., Ltd., Barford St., Birmingham.
Midland Fan Co., Ltd., 212, Aston Rd., Birmingham.
M.K. Electric, Ltd., Wakefield St., N.18.
Modinstal Electric Co., 1, King St., W.3.
Moseley, H. G., & Co., Ltd., Eddo Works, Hospital St., Birmingham.
Moulded Accessories, Ltd., 153, Great Hampton Row, Birmingham.

Nathan & Allen, Ltd., 131, Victoria St., S.W.1.
Nobbs, Geo., Ltd., 87, Cleveland St., Euston Rd., W.1.
Normand Elec. Co., Ltd., 3, North Side, London, S.W.4.

Orme Evans & Co., Wolverhampton.
Osler & Faraday, Ltd., 89, Newman St., Oxford St., W.1.
Ozonair, Ltd., Ozonair House, St. Leonard St., S.W.1.

Patent Switch & Fuse Indicator Co., Ltd., 59, Newall St., Bradford.
Petters, Ltd., Westland Works, Yeovil.
Philips Lamps, Ltd., 145, Charing Cross Rd., W.C.2.
Pickerings, Ltd., Globe Elevator Works, Stockton-on-Tees.
Power Specialities, Ltd., Viaduct Works, Wexham Rd., Slough.
Premier Electric Heaters, Ltd., Keeley St., St. Andrew's Rd., Birmingham.
Premier Engineering & Radiator Co., Ltd., Skerne Works, Darlington.
Pressed Steel Co. of Great Britain, Ltd., Cowley, Oxford.
Pulsometer Engineering Co., Ltd., Nine Elms Iron Works, Reading.

Quaker, Silas, Ltd., Crown Yard, Cricklewood, N.W.2.

Ransomes, Sims & Jefferies, Ltd., Orwell Works, Ipswich.
Ray Mouldings, Ltd., Exhibition Grounds, Wembley.
Raytonic Heating Co., Ltd., Windsor House, Victoria St., S.W.1.
Revo Electric Co., Ltd., Britannia Works, Tividale, Tipton, Staffs.
Reyrolle, A., & Co., Ltd., Hebburn-on-Tyne.
Rheostatic Co., Ltd., Slough, Bucks.
Richards & Co., Ltd., 122, Aldersgate St., E.C.
Rowland's Electrical Accessories, Ltd., Hockley Hill, Birmingham, 18.

Salford Electrical Instruments, Ltd., Peel Works, Silk St., Salford, Lancs.
Santon, Ltd., Somerton Works, Newport, Mon.
Sax, Julius, & Co., Ltd., West Lodge, Lower Mall, Hammersmith, W.6.
Scholes, Geo. H., & Co., Ltd., Blantyre St., Hulme, Manchester, 15.
Scotoid, Ltd., Bowyer St., Birmingham, 10.
S.F.P. Electrical Co., North Bar Works, Banbury, Oxon.
Siemens Electric Lamps & Supplies, Ltd., 38, Upper Thames St., E.C.4.
Siemens-Schuckert (Great Britain), Ltd., 30, New Bridge St., E.C.4.
Simplex Electric Co., Ltd., 159, Great Charles St., Birmingham.
Singer Sewing Machine Co., Ltd., City Road, E.C.1.
Sloan Electrical Co., Ltd., 8, Golden Lane, E.C.1.
Smith's English Clocks, Ltd., Cricklewood Works, N.W.2.
Soapstone Products Co., 99, Wood Vale, Forest Hill, S.E.23.
Sterilizair, Ltd., 11, Queen Victoria St., S.W.1.
Sturge & Baker, Ltd., Sheepcote St., Birmingham, 15.
Sullivan, H. W., Ltd., Leo St., Peckham, S.E.15.
Sun Electrical Co., Ltd., 118, Charing Cross Rd., W.C.2.
Sun-Vic Controls, Ltd., 430-431, Bush House, Aldwych, W.C.2.
Sykes & Dyson, Ltd., Queen's Mill Rd., Huddersfield.
Synchronome Co., Ltd., 32, Clerkenwell Rd., E.C.1.
Synclocks, Ltd., 117, Victoria St., Westminster, S.W.1.
Syntra Electric Supplies Ltd., Sentinel House, Southampton Row, W.C.1.

Tangyes, Ltd., Cornwall Works, Birmingham.
Telephone Mfg. Co., Ltd., Hollingsworth Works, West Dulwich, S.E.21.
Tellus Super Vacuum Cleaner, Ltd., 68, Victoria St., S.W.1.
Thermega, Ltd., 51, Victoria St., S.W.1.
Thermics, Ltd., 39, Little King St., Camden Town, N.W.1.
Time Recorder & Equipment Co., West Bank Works, Barking, E.7.
Tok Switches, Ltd., Kingsway House, 103, Kingsway, W.C.2.
Tricity Cookers, Wellington House, Strand, W.C.2.
Troughton & Young, Ltd., 143, Knightsbridge, S.W.
Tucker, J. H., & Co., Ltd., Kings Rd., Tyseley, Birmingham, 11.

Unity Heating, Ltd., Vincent House, Vincent Sq., S.W.1.

Vacuums, Ltd., Kingstanding Rd., Perry Bar, Birmingham.
Vandam, A., & Co. (1933), Ltd., Caxton House, Westminster, S.W.1.
Venner Time Switches, Ltd., Kingston By-pass Rd., New Maldon, Surrey.
Veritys, Ltd., Aston, Birmingham.
V.G. Manufacturing Co., Ltd., Gorst Rd., Park Royal, N.W.10.

Walker Fender Co., Ltd., Sherborne St., Ladywood, Birmingham, 16.
Walker, Hunter & Co., Ltd., Portdownie, Falkirk.
Wandsworth Electrical Mfg. Co., Ltd., Kenyon St., Birmingham, 18.
Ward & Goldstone, Ltd., Frederick Rd., Pendleton, Salford, 6, Lancs.
Waring Tube & Heating Co., Ltd., 4, Star Rd., West Kensington, W.14.
Warmo Heating Co., 48, Mortimer St., W.1.
Welbeck Company, 94, Baker St., W.1.
Wholesale Fittings Co., Ltd., 23 and 37, Commercial St., E.1.
Wiggin, Henry, & Co., Ltd., Thames House, Millbank, S.W.1.
Worthington-Simpson, Ltd., Newark-on-Trent, Notts.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Control of A.C. Motor Speeds

In his interesting article on this subject in your issue of October 12th, Mr. Dyson Rayner does rather less than justice to the capabilities of the variable-speed a.c. commutator motor. The impression he gives is that a 12½:1 speed range is approaching the limit of possibility with this type of machine. This, however, is by no means the case. As long ago as 1930 the British Thomson-Houston Co. built a machine with a 15:1 working speed range.

At the present time, as a result of extensive experience and improvements made in design, it is possible to build commutator motors to maintain their shunt characteristics down to zero speed, this range being achieved entirely by means of brush movement. Such machines are listed as standard, and a typical rating taken from our lists is 30/0 h.p., 1,800/0 r.p.m. This is by no means the limit of output, and we have built a machine as large as 400 h.p. at 500 r.p.m. with a speed range of 500/0 r.p.m.

H. A. PRICE-HUGHES,
Manager, Publicity Department,
Rugby, *October 15th.* British Thomson-Houston Co., Ltd

A Slot-meter Problem

Referring to the letter from "Too Old at 55" in your issue of October 5th, the description there given of an electrolytic prepayment meter corresponds exactly with a meter which was manufactured in London by this company for some years up to 1910. The electrolyte employed was caustic soda with a protective layer of paraffin, and the electrodes were of nickel, the central electrode being suspended by means of a nickel wire.

Whilst such a meter would to-day be considered to have definite limitations, it was, I think, easily the simplest type of prepayment meter which has yet been produced. The price per kWh was altered by the simple expedient of changing the glass tube for one of larger or smaller diameter.

ELECTRICAL APPARATUS CO., LTD.,
St. Albans, *Oct. 10th.* L. J. Matthews, *Meter Department.*

Regarding the recent query of a correspondent as to the fitting of some kind of dimming device to avoid the sudden loss of light when prepayment meters trip their switches, it appears to me that the addition of any choke or resistance devices to the internal mechanism of prepayment meters is not desirable since they are already sufficiently complicated, little room is available in the meter case and heating is to be avoided.

I suggest that all that is required could be obtained by the use of a 2μF condenser connected across the meter series, this giving sufficient dimming with one 40-W to 75-W lamp only. This condenser could, of course, be connected internally across the switch, but as it would be required only with existing meters, I believe a better method would be to connect it externally across the whole meter series terminals.

Such a device would also enable consumers to discriminate as to whether the meter switch had operated or if some of their installation fuses had blown, thus avoiding needless calls on the meter department for visits of inspection which are often unnecessary and at present only too common.

Manchester, *October 11th.* A. M. STRICKLAND, A.M.I.E.E.

Canvassing as a Load Builder

The article by Mr. W. F. Jarvis in your issue of October 12th is interesting, though most of the suggestions therein will appear elementary and fairly obvious to anyone with a commercial mind. Many of us will be surprised to learn, however, that such individuals as canvassers on behalf of electricity departments actually exist. I have been a consumer for many years, in London and in one or two of the largest provincial cities, but I have never received a visit from a representative of an electricity supply department to ascertain whether I was a consumer or whether the load I was taking could be augmented in any way by the use of additional appliances.

No doubt the great majority of consumers could say the same thing. In a fairly modern block of offices, in the heart of a large city not a thousand miles from Birmingham, I have seen an elderly gentleman carrying on his legal activities with an antiquated oil lamp as his sole source of artificial illumination. He might live to be a Methuselah before any official representative paid him a visit to point out to him the error of his ways.

Outside our large urban areas canvassing must be a heart-breaking job and certainly no sinecure in present circumstances. Even in the smallest villages of England the housewife is sufficiently electrically minded to dream of the day when she can have at least electric light in her cottage or farmhouse. But no amount of canvassing, no campaign of intensive publicity, can induce her to pay from ninepence to a shilling per unit for her supply, plus another copper or two in the sinister guise of meter rent. Where the rural inhabitant is more affluent he is finding it more economical to generate his own supply, and recently we have heard of manufacturers of private lighting plant enlarging their works substantially to cater for the demand. Thus a very useful load is lost to the grid, perhaps permanently, a thing which should not be allowed to happen.

Those engaged on the manufacturing side, with well-organised works fully equipped to deal with the demand for all classes of apparatus and accessories, should be working to far greater capacity considering the enormous potentialities in the sphere of electrical development. Until there is some national scheme for distribution little headway can be made by canvassing or any other form of publicity. The question is of urgent national importance, and it seems that those responsible have missed a golden opportunity considering the Government backing given to the beet sugar industry, and to the various agricultural marketing schemes for milk, pigs, and so on.

When such a scheme is in being, and the sooner the better for all concerned in the electrical industry, it is to be hoped that the Rip Van Winkles on the supply side will awaken to the significance of an ample and suitably selected sales force, and will no longer relegate the canvasser to the category of a hawker peddling trash from door to door. M. W. SINGER.

Birmingham, *October 13th.* M.Sc.Tech., A.M.I.E.E.

The Status of the Consumers' Engineer

Why does Mr. J. Lesser still insist on confusing a salesman with a sales or consumers' engineer? Surely every intelligent person engaged in the industry knows the difference between these two totally different jobs? If this is not the case, then it is high time that the status of the consumers' engineer was recognised. I think that practically everyone in the industry knows that the majority of salesmen are a long way from being anything like engineers. The mere fact that this is so does not prove that this state of affairs should be allowed to continue or is even right.

Again, Mr. Lesser suggests that the real point is "a person's ability to sell electricity." This is wandering so far from the real point that one almost begins to lose sight of the origin of this discussion. I am not aware that I suggested anywhere in my letter instituting an examination for salesmen.

For Mr. Lesser's information I would point out that my suggestion was that consumers' engineers are "engineers" in the true sense of the word and they are, therefore, entitled to a definite official position in the electrical world. The whole cause of this confusion is the fact that there is no official definition of a consumers' engineer, with the result that anyone, who feels so inclined, may award himself this title. The only effective method by which it could be decided whether an individual had sufficient knowledge to warrant the title would be to set him a suitable examination. J. RUSSELL HICKMOTT.

London, W.14, *October 12th.*

I am perplexed by your readers' contributions on this subject. Mr. Hickmott does not want the I.E.E. examination because it does not deal with the domestic side of electrical engineering. Surely "domestic" electrical engineering is something new.

I think most of your technical readers will agree that any problem arising in connecting a consumer, is a distribution problem which can very well be left to the distribution engineer. Installation inspection is in the province of an inspector who has graduated as an electrician. The forerunner to the two departments mentioned above is the salesman (sales engineer or consumers' engineer if you like). He is usually engaged to sway prospective consumers by enlightening them regarding the uses and comparative costs, in introducing electricity for domestic or business uses. His duties will include giving estimates for wiring work and the supply of appliances, giving information as to hire-purchase, assisted-wiring, &c., and getting the necessary application forms completed. As there is usually a price per point for wiring and list prices for appliances his mentality should not be taxed over these small matters.

The other abilities of a salesman fall quite clear of the engineer's province since he should be able to advise on such matters as where heating by conduction, convection or radiation is most suited to the situation, together with advice on hot-water systems, decorative schemes for lighting, &c.—always telling the truth as to working costs.

I rule out any question of "selling" electricity since the electricity supply industry has a monopoly, in the sense that the product can only be obtained from one source in any area.

I know of flourishing undertakings which have never had a sales staff, due in many cases to the ability of the clerical staff in giving valuable information to consumers who call at the office.

Those salesmen who think they deserve status could by all means have a diploma from some such body as the Electrical Development Association, but they should not crave for status equal to that of members of the I.E.E. BERNARD POINTON.

Wrexham, *October 13th.*

New Switchgear at Blackburn

THE Blackburn (East) generating station which contains two 12,500-kW sets was started up in 1921. Owing to its connection to the grid through two 15,000 kVA 6.6/132-kV transformers, Mr. W. A. Royle, the borough electrical engineer and manager, was faced with the necessity of providing new 6.6-kV switchgear to deal with the more onerous circuit conditions. Metal-clad gear manufactured by Messrs. A. Reyrolle & Co., Ltd., has been substituted for the whole of the original cellular type breakers and the new installation was formally inaugurated on October 11th by the Mayor, Alderman C. A. Critchley.

The possible fault kVA at the main switchboard under the worst conditions is 440,000 kVA, and at the auxiliary switchboard—owing to the interposition of reactors—236,000 kVA. The new switchgear is of the horizontal-draw-out, single busbar type, with a rated capacity of 500,000 kVA for the main and 250,000 kVA for the auxiliary switchboard.

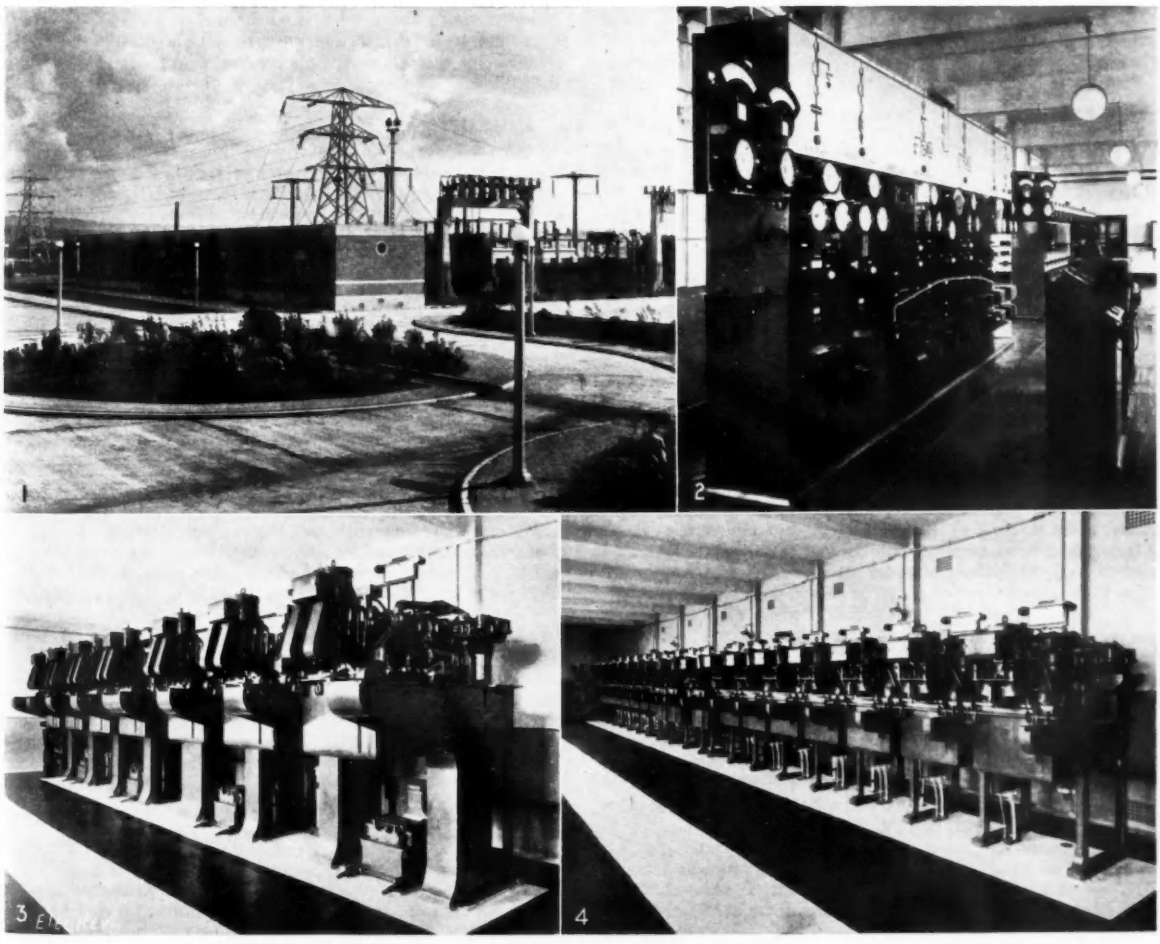
The seven "T.2" 2,000-A units make up the first. These are electrically operated from a control board of black sheet-steel fronted cubicles with white enamelled sheet-steel indicator panels with the main-line diagram in coloured relief. Automatic semaphore disc indicators show the position of the breakers and isolators.

The auxiliary switchboard consists of three "B.4" 2,000-A and fifteen "B.2" 400-A panels, also electrically operated from a control board that is similar to the other but has no diagram indicator panels. Six single-phase wound-on concrete reactors are housed singly in a special chamber. An illuminated indicator is mounted above the centre compartment on each side of the back-to-back arrangement to show the position of the switchgear unit on both sides of the reactor bank.

The new switch house is adjacent to the C.E.B. sub-station and the cables connecting it with the control room were supplied by Derby Cables, Ltd., and laid by the Corporation staff. The estimated cost of the whole work was £31,500 and the actual cost less than £27,000.

At the inauguration ceremony Mr. W. A. A. Burgess (Messrs. Reyrolle & Co.) presented the Mayor with a replica of a switch panel in the form of a perpetual calendar. The Mayor expressed the view that the progress made during the past five years would be continued under Mr. Harral, the new engineer; he hoped they would be able to reduce the price of electricity still further. The area of supply had been extended, and they were looking to the rural areas to add to their load.

Mr. C. Furness, Blackpool's electrical engineer, on behalf of the engineers of North-West Lancashire, congratulated Mr. W. A. Royle, the Blackburn engineer, on his appointment to Sunderland, which was an encouragement to the younger men. Mr. W. A. Royle paid a tribute to the assistance given him by the chairman and his committee and by the whole staff in the reorganisation that had been carried out during his five years in Blackburn. Ald. Boothman, chairman of Clitheroe Electricity Committee, also spoke.



The New Switchgear at Blackburn East

1. The new switch house with the Central Board's sub-station in background. 2. The main control board for the "A.2" switchgear. 3. The main 500,000-kVA, 2,000-A switchboard. 4. The auxiliary 250,000-kVA gear

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Distribution Needs Greater Attention

IN his second successive presidential address to the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS in London on October 16th, Mr. J. M. Kennedy remarked that the number of employés of electricity supply undertakings was steadily increasing. Although the number employed in generating stations had fallen, there had been an increase of nearly 10 per cent. per annum in those employed in distribution and administration.

There was every indication that within the next two years sales would exceed the estimates upon which the regional schemes of the Central Electricity Board were based. During the last six months the Electricity Commissioners had sanctioned the installation of over 250,000 kW of plant, which exceeded the aggregate of the last three years. But they must beware of being complacent. How were they going to maintain progress over the next decade?

The problem was not how much electricity could be sold at the average prices now being offered, which in many cases were bringing in an unnecessarily high return on the capital invested, but what steps could be taken to ensure that electricity was made available at an economic price to all potential consumers. The existing 630 undertakings had a total of approximately 5.3 million consumers at the end of the financial year 1932-33, but of those only about 78 per cent. (or, say, 4.2 million) were domestic consumers. As there were about 12 million separate families in Great Britain, it appeared that we had only reached a "saturation" of 35 per cent. of the possible figure.

An Indication of the Scope

It was especially necessary that all undertakings should put forward attractive tariffs for the all-electric equipment of artisans' dwellings, so that they might be in a position to supply the large number of new buildings which would be erected during the next few years in connection with the Government's slum clearance and housing policy. If they were not equipped electrically in the first instance, a great opportunity would be missed, capital would be wasted, and it might be several years before a conversion could be effected.

The latest returns showed that in many undertakings, although the domestic consumers represented 80 per cent. of the total number of consumers, they only consumed about 60 per cent. of the so-called "lighting and domestic units." This meant that the average sold per domestic consumer was only about 450 kWh. The number of electric cookers in use was believed not to exceed 400,000, or less than one-tenth of the number of domestic consumers. If the overall price were within their means, consumers would not be slow to appreciate the comforts and cleanliness resulting from an all-electric equipment.

Small Reduction in Distribution Costs

There had been a reduction in generating costs and charges from 1.26d. to 0.64d. per kWh generated in the last ten-year period. As over 40 per cent. of the cost of generation was represented by capital charges on plant and buildings, the number of kWh sold per £ of capital was an important factor, and in the same period this had increased by nearly 50 per cent., from 45 to 65 kWh. But on the distribution side science appeared to have been asleep. Those responsible for the industry had been so engrossed in the race for lower generating costs that they had forgotten to wake her up, with the unfortunate result that distribution costs had only fallen from 0.83d. to 0.72d. This small reduction was entirely due to savings in repairs and management costs; capital charges had remained almost stationary, and the kWh sold per £ of distribution capital had actually fallen from 50 to 45, having been up to 55 in some of the intervening years.

The reduction of tariffs increased sales, which in their turn decreased costs and justified the reduced tariffs. There was too much parochialism in the outlook of some of those responsible for the conduct of the industry. Many still clung to the idea that their area was quite exceptional in its characteristics and that what suited one town was quite unsuitable to another, ignoring the fact that human nature was the same the world over. There was also in some cases a lack of enthusiasm, and even a lack of belief in the service which they had to offer. It was only those who did not wish to believe in the all-electric house who were liable to raise difficulties.

Electricity in Factories

SOME of the more important aspects of the use of electricity in factories formed the subject of Mr. R. G. Devey's inaugural address as chairman of the Mersey and North Wales (Liverpool) Centre of the INSTITUTION OF ELECTRICAL ENGINEERS on October 15th.

Mr. Devey said that since the acceptance of 50-cycle a.c. as the standard system of distribution at 400 V three-phase for power and 230-V single phase for lighting, a.c. motors and starters had been manufactured on such a large scale that they were now obtainable for approximately half the price of d.c. machines; they were also less costly to wire.

When laying out installations large industrial concerns endeavoured to standardise their electrical equipment in order to keep down capital expenditure and reduce the number of spares needed. But Mr. Devey was appalled to find how much some supply authorities were lacking in the development of their systems on modern standard lines, and was astounded at the variety of prices quoted. There was a need for some united effort to level up the charges made for electricity.

The industrialist was waiting for cheap power; when that became available he would avoid installing his own generating plant and change over entirely to public supply. Exceptions would occur in cases of back-pressure plant exhausting into the factory process-steam mains, thus obtaining a higher thermal efficiency.

Types of Motors and Drives

Group drives could be installed for a lower expenditure on electrical equipment than individual drives, but the additional cost of overhead shafting, its operating expenses, and the stronger ceilings needed must be considered. The cost ratio was of the order of 1 to 1.85 with semi-enclosed motors of 600 and 1,000 r.p.m. respectively.

While individual drives were proving to be most popular, there were instances in which small machines could be grouped together with advantage. From the point of view of safety of the operators, individual drives were undoubtedly the most desirable.

Variable speed a.c. motors of the commutator type were expensive, but with increased use the manufacturing cost had been considerably reduced, and it was anticipated that in the early future it would be no more costly than that of the ordinary shunt wound, variable speed, d.c. motor. This was an important factor, as there was a large demand for variable speed control on most machines in industrial works, owing to variation in quality of raw materials, and in many cases to changing atmospheric conditions. The slip-ring motor was losing favour owing to the fact that when set for constant speed it was liable to alter with variations in load.

For industrial work it was good practice to arrange for all control gear to be ironclad. Where there was no danger of breakage, glass windows might be fitted in suitable metal frames to enable the maintenance staff to observe whether any contacts which were in operation required attention. All ironclad control gear should be totally enclosed, as ingress of dirt meant high maintenance cost, the inside of motor starters and gear being very difficult to keep clean.

Distribution within Factories

The exterior distribution of low-voltage electrical energy in factories required consideration. Overhead cables mounted on poles with insulators carried along roads or over roofs within the works area was a satisfactory and easily accessible system for adding to. An alternative method was to use paper-insulated armoured cables underground, either laid solid or in ducts.

Cables laid in either of these ways, carefully arranged, would have a life of twenty-five years. For internal distribution lead-covered systems had a shorter life and were more subject to breakdown than steel conduit wiring or v.i.r. cables mounted on insulators fixed to the walls or ceilings.

A sound system of plant inspection guarded against major breakdowns and reduced repairs to a minor item.

Industrial Lighting

The efficient lighting of factories was of much greater importance than was generally realised by manufacturers; the hours per annum during which artificial lighting was required were approximately:—24-hour working, 46 per cent. (three shifts); 16-hour working, 31 per cent. (two shifts); 8-hour working, 12 per cent. (one shift). The cost of lighting was usually well under 1 per cent. of the manufacturing cost and

should easily be recovered by increased output and improved quality of the goods manufactured.

Some manufacturers favoured the mixing of daylight lamps with ordinary lamps, but a more common practice was to have a small separate room or kiosk where colour-matching could be carried out. It was considered good practice to have a separate independent pilot lighting system to enable the main lighting to be switched off when the factory was closed.

Progress in Illumination

THE annual progress report prepared by the Technical Committee of the Illuminating Engineering Society, which was submitted to a meeting in London on October 9th, records that in the year ended August, 1934, a new Standard Specification (No. 161) for tungsten filament lamps was issued which not only sets out several new requirements, but also provides a definite means of independent testing.

The new coiled-coil filament, which is at present available in the 40-W size, has an efficiency some 20 per cent. higher than the ordinary 40-W gas-filled lamp. The coiled filament is rewound into a second coil so as to present an appreciably smaller effective surface to the cooling influence of the inert gas with which the bulb is filled; less heat is lost to the gas by convection.

Considerable improvement has been made in the long tubular lamps with side contacts (known as architectural lamps), which are now available in standard opal finish and a wide range of colours, the colour being actually in the glass. Single-ended tubular lamps in diffusing bulbs are also now available in various shades of colour.

The provision of a small cut-out in the 14-V 7-W series sign lamp of a type which short-circuits as soon as the filament of a lamp fails allows the remainder of the lamps in circuit to remain in operation.

Electric Discharge Lamps

Material advances in the design of discharge lamps have taken place; one form now has a third electrode for the purpose of initiating the discharge. Notable advances have been the introduction of lamps for special purposes having an increased percentage of red light in the spectrum, and a 250-W discharge lamp, and lanterns having tubes burning in a horizontal position have been introduced. In addition to the above mercury-vapour types, a sodium lamp is constructed in the form of a tube folded in four and is enclosed in a detachable vacuum glass in order that the temperature may be maintained at the requisite value.

There has been a revival of the idea of making use of luminescent carbon dioxide gas for colour matching.

Domestic and Office Lighting

The tendency has been towards simplicity, absence of glare, and compactness. For domestic lighting the use of flashed opal glass to conceal the source and diffuse the light, coupled with design which reduces harbourage of dust continues to find favour, while in large offices enclosed and boxed-in fittings, furnishing luminous surface of moderate area, but low brightness, are becoming general.

Progress in architectural lighting is marked chiefly by the greater application of indirect lighting in all types of buildings in the form of niches, cornices, troughs, brackets, torchieres, and fittings, also the use of lighting through the edge of glass with an etched design for decorative effects by means of tube lamps.

Industrial and Public Lighting

So far as can be ascertained the lighting of new factories, both by daylight and artificial light, is generally satisfactory and in conformity with present accepted standards of good practice. In older, and more particularly in smaller, factories little progress towards better conditions of lighting appears to have been made during the period under review. In many modern installations, however, the order of illumination is very much higher than that customary a few years ago.

During the past year recognition of the value of good street lighting has grown. Improvement in existing street lighting, while still delayed for economic reasons, has been encouraged by better-informed technical and public opinion, by the claims of road safety, and by new facilities as regards illuminants and accessories. House-building and street-making have led to numerous new installations.

Another step of considerable importance has been the appointment, under the Ministry of Transport, of a Departmental Committee on Street Lighting, whose terms of reference are "to examine and report what steps could be taken for ensuring more efficient and uniform street lighting, with particular reference to the convenience and safety of traffic and with due regard to the requirements of residential and shopping areas, and to make recommendations."

The installation of luminous traffic control equipment has again extended rapidly, a contributory circumstance being the agreement of the Ministry of Transport to contribute up to 60 per cent. of the cost of installation of approved types of signals. Six main systems of control, namely (1) manual; (2) local; (3) synchronised; (4) staggered; (5) progressive; and (6) traffic actuated, are in use. Of these (5) is regarded as the most flexible and specially suited to blocks of unequal length.

In the Courts

AT the Dewsbury County Court on Tuesday, before His Honour Judge Drysdale Woodcock, K.C., the Yorkshire Electric Transformer Co., Ltd., of Thornhill, Dewsbury, sued Standard Switchgear, Ltd., New Oxford Street, London, W.C.1, for the balance of the price of goods sold and delivered, work done, materials supplied, etc.

The statement of claim showed that two 750-kVA three-phase transformers and dial thermometers, bought by the defendants under contract in writing, contained in a letter to the plaintiffs on February 24th, 1934, at the price of £501, were delivered to the defendants. The work done and materials supplied and delivered amounted to £58 19s. 3d., making a total of £559 19s. 3d. The defendants had paid £492 17s. 3d., leaving a balance of £67 2s., the amount claimed.

The defence produced an affidavit sworn and signed by the technical director of the defendant company, who said that his company denied that it was indebted to the plaintiffs. The defendant company admitted its liability to pay £501, subject to a deduction of £8 2s. 9d., and had in fact paid £492 17s. 3d. The plaintiff company had failed to deliver the transformers in accordance with the terms of the contract, and the sum of £8 2s. 9d. was the cost of removing the transformers to site and erecting them. The defendant company denied that it was liable to pay £58 19s. 3d. claimed in the action for work done, etc., as the work in question was incurred by the plaintiff company on its own initiative and without the authority of the defendant company or its servants.

Mr. H. R. B. Shepherd opening the case for the plaintiff, said that most of the facts were agreed between the parties as was disclosed by the correspondence which had been of a voluminous character, and which he would hand to His Honour. These transformers were for the Gravesend Corporation Electricity Department, and they had to be delivered at Harmer Street, Gravesend. It appeared that when the transformers arrived there was not proper tackle for unloading them, and in consequence damage was done to one of the transformers. The second transformer was taken to New Street, a mile or a mile-and-a-half away, and unloaded. The damaged transformer was ordered to be taken back to Dewsbury, and in due course the plaintiff company carried out the repairs and the defendants declined to accept liability.

William Miles Lydall, managing director of the plaintiff company, said it was customary to send goods in the way that the two transformers in question had been sent to London, unless there was a special contract to the contrary. In that case, they engaged private haulage men to take the goods, and they were not accompanied by anybody from the plaintiff company. The latter had not received an express order from defendants with respect to the repairs. On May 17th he wrote asking for an order to do the repairs and returned the transformer as expeditiously as possible.

His Honour asked if anything had been done by way of repairing the damaged transformer before they had received a letter from the defendants. Mr. Lydall replied that it was repaired immediately it arrived back at their works and by the time they received that letter the repairs were done.

Hedley Tinker, Horsforth, Leeds, a lorry driver, said he undertook the haulage of goods for the plaintiff company. On May 13th, he received instructions to take the transformers in question to Gravesend, and he did so. He had a mate with him, and nobody from the plaintiff firm. When he got to Harmer Street, Gravesend, he presented a delivery note to a representative of the defendants. He was kept waiting for about two hours, being then taken round to New Street. He explained how the accident to one of the transformers occurred, and said that the accident was followed by a discussion between the representatives of the defendant company and the Gravesend Electricity Department, as the result of which other means for unloading the second transformer were adopted. The instructions for him to take the damaged transformer back to Dewsbury were given by a representative of the defendant company.

Leonard Fermour, for the defence, said that in May when the transformers were despatched to Gravesend he was in the employ of the defendants, but he was no longer in their employ. The transformers arrived at Gravesend on a high lorry instead of a low one.

His Honour, summing up, said that case divided itself into two parts. First, there was a claim for goods delivered at a wrong site. On that issue he was satisfied that plaintiffs did everything that was right and proper. They asked for the address of the site at which to deliver the goods. They ob-

tained instructions and gave them to their carrier to take the transformers. They were actually taken to a site, but had to be moved. The plaintiffs, however, had done all they were bound to do under the contract, and during that time defendants' agent was in attendance when the goods arrived at the first site to which they were sent.

One of the transformers was taken off the wagon and in the process it was damaged. He was not concerned with the issue as to whether it was the duty of the plaintiffs to send the goods on a low or a high trolley, nor to whether it was the duty of the plaintiffs to unload on the site, and for this very simple reason—that if one person did an act that was within the cognisance of the party in whose favour it was done, there was an end of the matter. That would have raised quite a nice point. The defendants, however, took on themselves the delivery, and having put themselves in the position of unloading the goods they carried that out and no charge had been made upon the plaintiffs for unloading. He thought that the people who took the goods were perfectly justified, because they tendered them at the proper place, upon the order of someone in authority. Then they were ordered to take them to a second site that had been declared.

His view was that the delivery on the site had been varied by some person in authority, and the carrier was perfectly entitled to take the goods to the varied site, and acceptance of them there was not refused. On that issue of the £8 odd, he would give judgment in favour of the plaintiffs.

As to the second point, which was really the big issue, namely, with regard to £58 for the repairs, etc., he found that instructions were given that the goods were to be taken back to Yorkshire. He was asked to say by Mr. Shepherd that those instructions carried with them an implied authority to do the repairs, which had been done. In commercial matters it would be most dangerous for him on such slender evidence to say that there was authority given to do the repairs of the damage. He was very much astonished that the defendants were availing themselves of such a defence as had been given in the case between two firms of repute.

The repairs had been done, and because there was no expressed authority given for the doing of them, the defendants practically said, "We are not going to pay you." That was not the sort of foundation upon which the high credit of the great businesses of this country had been built, but he had to decide as far as he could what the law was on the case. He could not find from the correspondence or from the evidence that any expressed authority had been given for the repairs to be done, and therefore the second part of the claim relative to the £58 odd failed. Judgment would be given for the plaintiffs for £8 2s. 9d.

Mr. Shepherd asked for costs on Scale C on the grounds that this was a case of some importance, but His Honour said that he could not grant that. Mr. Shepherd then asked for a certificate for Counsel's costs, which His Honour granted.

British Overseas Electrical Trade

Exports higher but imports decline

THE Board of Trade returns for September show that the total value of goods exported during the month was £924,898, representing an increase of £150,483, or nearly 20 per cent., compared with September, 1933.

It is a happy sign that the improvement was not confined to one or two classes of goods, but was fairly general. The only items the export values of which decreased were electric motors, accumulators and primary batteries, the drop in the last case being insignificant. The principal increases were in wires and cables (£39,249), wireless apparatus (£33,398), and unenumerated goods and apparatus (£40,950).

With regard to imports, the total of £288,301 was £7,603 less than in September, 1933, equivalent to a decrease of about 2½ per cent. The largest decline was in connection with radio receivers, excluding valves (£28,370).

The table given below shows the destinations of the four principal classifications, but the following brief analysis of a few of the smaller items is of interest, the figures for September, 1933, being given in parentheses :—

Rubber-insulated wires and cables: Australia, £22,670 (£10,424); South Africa, £17,632 (£16,059); British India, £10,736 (£14,304); New Zealand, £2,903 (£3,886); other British countries, £11,579 (£11,644); foreign countries, £6,365 (£7,733).

Electric wires and cables (insulation other than rubber): Australia, £18,001 (£7,111); South Africa, £16,904 (£11,590); British India, £10,663 (£11,350); other British countries, £9,195 (£9,012); foreign countries, £8,919 (£4,378).

Telegraph and telephone apparatus (not radio): Australia, £21,141 (£3,278); South Africa, £10,114 (£16,505); Canada, £906 (£257); other British countries, £13,129 (£13,790); Argentina, £4,490 (£271); other foreign countries, £35,993 (£41,875).

Electrical goods and apparatus were imported into this country as follows :—Netherlands, £57,719 (£47,288); Germany, £55,424 (£65,671); United States, £42,111 (£63,662); France, £17,144 (£10,852); Switzerland, £16,997 (£14,833); Belgium, £9,209 (£8,813); Austria, £7,552 (£11,212); other foreign countries, £20,945 (£28,012); British countries, £13,324 (£16,828).

Vacuum cleaners were supplied by the following :—Canada, £1,982 (£4,267); Sweden, £1,367 (£4,058); Germany, £1,170 (£381); United States, £514 (£1,111); other foreign countries, £1,649 (£651).

EXPORTS AND IMPORTS DURING SEPTEMBER

	Exports. Sept., 1934.	Exports. Inc. or dec. compared with Sept., 1933.	Imports. Sept., 1934.	Imports. Inc. or dec. compared with Sept., 1934.
Submarine telegraph and telephone cables	£7,901	+ £6,541	*	—
Telegraph and telephone wires and cables (not submarine)	21,917	+ 4,632	*	—
Other insulated wires and cables	135,567	+ 28,076	£17,690	− £3,846
Radio receivers (excluding valves)	22,936	+ 1,864	11,424	− 28,370
Radio transmitters (excluding valves)	30,008	+ 8,573	*	—
Radio valves	38,579	+ 12,184	18,115	− 4,785
Other radio parts and accessories	38,069	+ 10,777	58,342	+ 2,699
Telegraph and telephone apparatus (other than radio)	85,773	+ 9,797	*	—
Electric carbons	*	—	13,288	+ 1,984
Incandescent lamps	42,580	+ 7,977	8,071	− 6,146
Other lighting apparatus	39,347	+ 11,541	29,713	− 1,422
Primary batteries	17,926	− 27	201	− 150
Accumulators	52,319	− 8,401	*	—
House service meters	10,820	+ 3,197	*	—
Other electrical instruments	16,213	+ 4,708	19,888	− 5,928
Unenumerated electrical goods and apparatus	121,823	+ 40,950	63,693	+ 19,218
Electric generators up to 200 kW.	15,790	+ 3,507	*	—
Electric generators over 200 kW.	35,132	+ 29,277	*	—
Electric motors	64,516	− 41,302	11,231†	− 1,443
Convertors and transformers	37,755	+ 3,407	*	—
Starting and controlling gear for motors	19,546	+ 6,871	*	—
Switchgear	59,717	+ 4,658	*	—
Other electrical machinery	10,664	+ 1,676	29,963	+ 24,372
Electric vacuum cleaners	*	—	6,682	− 3,786
	£924,898	+ £150,483	£288,301	− £7,603

* Not classified separately. † Not railway and tramway motors.

BRITISH ELECTRICAL EXPORTS DURING SEPTEMBER

Destination.	Goods and apparatus, Sept., 1934.	Inc. or dec. compared with Sept., 1933.	Electric generators, Sept., 1934.	Inc. or dec. compared with Sept., 1933.	Motors, Sept., 1934.	Inc. or dec. compared with Sept., 1933.	Other electrical machinery, Sept., 1934.	Inc. or dec. compared with Sept., 1933.
Irish Free State	£45,920	+ £18,381	*	—	*	—	*	—
Union of South Africa	98,629	+ 17,323	£18,556	+ £17,600	£9,473	− £12,586	£41,190	+ £8,861
British India	76,437	+ 12,442	2,648	− 510	12,224	+ 566	29,190	+ 6,759
British Malaya	14,122	+ 3,489	*	—	*	—	3,919	+ 2,844
Ceylon	6,678	+ 2,911	*	—	*	—	*	—
Hong Kong	21,292	− 1,667	*	—	*	—	*	—
Australia	100,867	+ 50,786	3,845	+ 2,980	2,887	− 2,090	9,285	+ 4,623
New Zealand	31,499	+ 5,628	*	—	2,447	+ 836	2,349	− 230
Canada	6,480	+ 1,778	470	+ 408	3,611	+ 1,423	1,907	+ 1,052
Other British Countries	50,088	+ 2,342	10,731	+ 9,375	10,560	+ 5,168	10,976	− 1,697
Sweden	19,834	+ 3,781	*	—	*	—	*	—
Denmark	14,071	+ 3,906	*	—	*	—	*	—
Belgium	10,298	− 4,985	*	—	*	—	*	—
France	13,667	+ 3,662	*	—	*	—	2,218	− 803
Spain	4,301	+ 310	*	—	*	—	*	—
Italy	2,886	− 2,609	*	—	*	—	*	—
Greece	1,898	+ 352	*	—	*	—	*	—
Egypt	7,266	+ 99	*	—	*	—	2,051	+ 1,582
China	12,095	+ 1,904	*	—	*	—	6,686	+ 1,649
United States	10,319	+ 8,038	*	—	*	—	*	—
Argentina	17,634	+ 7,021	*	—	*	—	1,490	− 2,276
Soviet Union	*	—	961	− 3,375	18	− 41,574	415	− 9,750
Netherlands	*	—	286	+ 275	910	− 364	1,092	+ 299
Other Foreign Countries	115,497	+ 7,487	13,425	+ 6,031	22,386	+ 7,319	14,914	+ 3,699
Total	£681,778	+ £142,389	£50,922	+ £32,784	£64,516	− £41,302	£127,682	+ £16,612

* Not classified separately.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures

The Fair at Castle Bromwich

The plans that have been prepared for the Engineering and Hardware Section of the British Industries Fair at Birmingham in May next show that there will be a very large extension of space for outdoor exhibits. These will be divided into four sub-sections: (A) Indoor: hardware; outdoor: farm and garden. (B) Indoor: building and heating; outdoor: public works, quarry and roads (materials). (C) Indoor: electricity; outdoor: public works, quarry and roads (accessories). (D) Indoor: engineering; outdoor: public works, quarry and roads (machinery).

Mr. J. Percy Plant is chairman of the Section. We understand that the applications for inside space are so great that the indoor part will probably be fully booked within the next few weeks.

Electric Service Vehicles

Two 5- to 7-cwt. battery vehicles have been purchased by West Ham Electricity Department primarily for service work in connection with hired electrical apparatus. The chassis is a standard production of Messrs. Partridge, Wilson, Ltd. The body, designed by the Electricity Department and built by Messrs. Tomlinson (Marylebone), Ltd., carries the modern streamline effect to considerable limits, the up-to-date appearance being enhanced by the use of chromium-steel lettering at the sides. Goods are loaded into the vehicle by sliding up the tapered roof from the back. The D. P. Kathanode 24-cell battery (which has a capacity of 128 Ah at a five-hour discharge rate) is supported from the chassis in a central position, to which access is obtained by lifting the floor boards. A 3¼-h.p. Met.-Vick. motor, flexibly coupled to a standard transmission shaft, drives the back axle through a differential. The control system has been especially designed for the vehicle and makes a neat and compact job; the operation of the preselector arm on the steering column (with three forward, two reverse, and neutral positions) calls for little skill in driving. The battery can be left on charge in the unattended vehicle during the night, current being switched off automatically when it is fully charged by a Sangamo meter, which also records the state of discharge. The tariff for night charging is 0.66d. per kWh. Marles-Weller steering and Lucas lighting, horn and screen wiper are employed.

The range of the vehicle is 50 miles per charge, with a maximum speed of 20 m.p.h., and its normal daily duty will be from 20 to 30 miles. The loading enables three 1½-cwt. cookers to be carried in addition to the driver, and it is proposed to fit the bodies with tools and spare parts to enable minor faults to be rectified on the spot. The capital cost of each vehicle is about £250, but this figure covers the provision of several refinements. Including standing charges, and allowing a life of ten years, Mr. J. W. Townley, the borough electrical engineer, estimates the overall cost at 2d. per mile, or 30 per cent. less than that of a petrol van, the life of which is taken as five years.

Two views of the new West Ham electric van

The "Exide" Luncheon

The Chloride Electrical Storage Co., Ltd., held its customary luncheon to mark the opening of the Motor Show at the Clarendon Restaurant, Hammersmith, on Thursday last week. Mr. D. P. Dunne, managing director of the company, presided, as usual, and, in welcoming the guests, jocularly referred to the wonderful new batteries which were "unearthed" from time to time. He assured his audience that marvellous overnight discoveries in battery construction simply did not happen. The progress which had been made in batteries was due solely to long, continuous research. The use of storage batteries continued to expand; in addition to the growth in the number supplied for automobiles, important outlets were presented by emergency lighting systems and electric vehicles. With regard to the latter, he said that at the present day there were more of these vehicles on the roads of this country than at any previous time. The development of the electric vehicle had been in the direction of simplification, while the automobile had been consistently elaborated.

Mr. H. C. Lafone, editor of the *Autocar*, and Mr. R. T. Lewis thanked the company for its hospitality.

Registered Electrical Contractors

Applications for registration by the following were accepted by the Executive Committee of the National Register of Electrical Installation Contractors at its last meeting:—

E. Lee & Co., Manchester 15.
J. Riley, Moss Side, Manchester.
A. Francombe Morley, Tottenham, N.15.
Rhymos, Ltd., Wood Green, N.22.
C. E. Hancock, Sparkford.
Light & Power Contractors (Liverpool), Ltd., Edge Hill, Liverpool.
W. G. Perry & Co., Ltd., Pall Mall East, W.C.2.
C. Birt, Southsea, Hants.
Peacock & Porter, Ltd., Glasgow.

At the same meeting three applications were withdrawn and fifteen were declined.

A Lighting Conference at Sheffield

A two-days' conference, arranged by the Sheffield Corporation Electricity Department and the Lighting Service Bureau, with the support of the Electrical Contractors' Association and other bodies, was held in Sheffield on October 10th and 11th. Mr. Ernest Morgan, general manager of the Corporation Electricity Department, who opened the conference, said that reports had been made to him from time to time regarding the bad and dangerous lighting which existed in factories to-day. In reorganisation schemes to obtain greater efficiency factory owners often forgot what was of great importance—good lighting in their factories. Mr. A. C. Bostel, consumers' and sales engineer of the Electricity Department, who presided, said it was a pity that manufacturers should spend a lot of money in getting the highest efficiency out of their machinery without attending to the proper lighting of their factories. Mr. W. J. Jones (London), manager of the Lighting Service Bureau, gave an address at the morning session on "Electric Lighting Progress and the Relationship between Lighting and Seeing." Mr. J. W. Howell stated that of the 46,000,000 people in this country about 6,250,000 worked in factories. He could prove by Government figures how better lighting had increased outputs and improved quality, and that there was a definite monetary value to be gained from installations of better lighting. "Lighting Units and Fundamentals" was the subject of a lecture by Mr. J. Kemp, who dealt with modern methods of illumination.

On the second day of the conference Mr. L. E. Buckell gave details of electric lamp characteristics, and said that the cost of electric lighting to-day was not more than one-third of the cost twenty years ago.

Mr. J. F. Colquhoun, public lighting engineer for Sheffield, said that he would advise those who used any considerable quantities of lamps to test them all. His department tested every lamp used for street lighting in Sheffield. Some

time ago they obtained some British lamps from a reputable firm, which were below standard in several respects. Some of the figures, however, were highly creditable to lamp manufacturers. Recently they removed some 60-W lamps from a residential area and replaced them by 100-W lamps. They fitted 5,564, and from August 1st last until October the average burning life of the lamps had been 300 hours. Only sixty-eight had to be replaced, which was an average of 0.12 per cent. Mr. W. J. Jones spoke on lighting installations, and Mr. L. Lingard dealt with the problem of lighting in works.

New Showrooms at Wallasey

The new offices and showrooms of the Wallasey Corporation Electricity Department are to be formally inaugurated on Monday next by Ald. J. Hughes, chairman of the Electricity Committee.

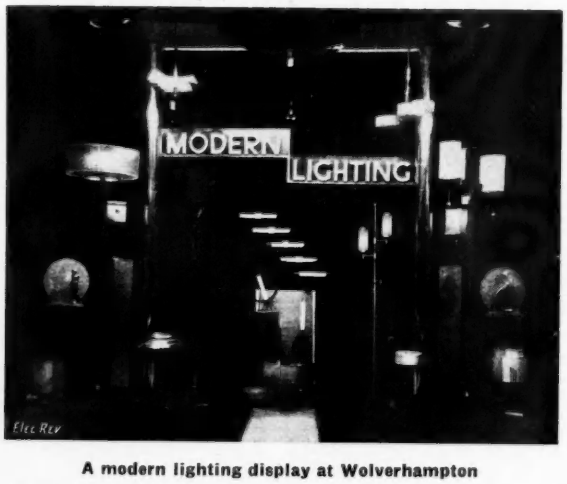
Propaganda in North London

The electrical trade is well represented at the ninth annual North London Exhibition, which was opened at the Alexandra Palace by Capt. D. Euan Wallace, M.P., on October 10th, and continues until Saturday, October 27th. The Exhibition covers all phases of housecraft, and one of the largest and most attractive stands is that of the North Metropolitan Electric Power Supply Co., showing a wide range of cookers, refrigerators, vacuum cleaners and electric clocks. The stand is an imposing structure, designed by Mr. C. J. Barnett, superintendent of the central area, and provides for display space round a lecture room, the roof being cantilevered out to avoid obstructive supports. Benjamin reflectors are fixed under the extended roof, and the stand is surmounted by a 6-ft. Smith electric clock. Cookery demonstrations are held both in the lecture room and outside on the stand. Useful propaganda is achieved by the distribution of an interesting eight-page *Northmet Exhibition News*, in which electrical and general items are cleverly intermingled. Eighty thousand copies are being distributed. An innovation this year is an 18-ft. captive balloon near the Wood Green entrance which displays the words "Use Northmet Electricity." This is illuminated by a battery of Metropolitan-Vickers floodlights. Nearby is a sixteen-sheet hoarding lighted by Benjamin reflectors, and the south terrace side of the Palace is floodlighted by G.E.C. equipment. Other stands of electrical interest show Welbeck and Hotpoint cleaners and Thor washers. Parker's Radio, of High Street, Wood Green, has a large display of wireless sets and radiograms. A model house exhibited by a firm of builders as an example of a number which they are erecting at Winchmore Hill utilises electricity for lighting, heating, cooking, wireless and a washboiler. The house is floodlighted by "Ediswan" projectors. The Springvale Electrical Co. are official electrical engineers to the exhibition.

The "Northmet" stand at the North London Exhibition

A Display of Modern Lighting Fittings

The accompanying illustration is reproduced from a photograph sent us by Mr. T. A. G. Margary, the electrical engineer and manager of the Wolverhampton Corporation Electricity Department, of a recent window display at the electricity showrooms. It demonstrates how modern lighting fittings can be arranged with striking effect.



A modern lighting display at Wolverhampton

A Manchurian Electrical Combine

A company called the Manchuria Electricity Corporation, Ltd., with a capital of 90,000,000 yen (£9,000,000 at par) has been formed to control the nine fairly large power stations at present existing in Dairen, Yingkow, Antung, Mukden, Hsinking, Kirin and Harbin (where there are two) as well as twenty smaller stations in other towns. Of the total capital 65,000,000 yen (£6,500,000) will be held by the South Manchuria Electric Co. of Dairen, which holds more or less of a monopoly in South Manchuria and the Kwantung Leased Territory, and the remainder by the Manchurian companies. It is not proposed to issue any new shares. The first meeting of the new concern was attended by leading officials of the Manchukuo Government, the South Manchurian Railway and the Central Bank of Manchukuo, as well as representatives of the Japanese War Department, and it was decided that it should be placed under the joint jurisdiction of the Governments of Japan and Manchukuo.

"M.-V." Apprentices' Speech Day

A combined function took place on October 13th when the directors of Metropolitan-Vickers Electrical Co., Ltd., invited the parents and guardians of between 600 and 700 trade apprentices employed in their Trafford Park works, first to visit the company's works and second to be present at the trade apprentices' Speech Day function. Over 1,100 visitors availed themselves of this opportunity, and during the afternoon passed through the company's various workshops and departments accompanied by apprentices who, with the company's foremen, acted as guides and demonstrators to the visitors. At the conclusion of the works tour the company entertained the guests to tea, which was followed by the eighteenth annual speech day function of the trade apprentices. The Mensforth Shield was won by Mr. W. R. Chambers, and after the presentation of shields, cups, medals and trophies by Mrs. G. E. Bailey, wife of the director of manufacture, an address was given by Mr. A. P. M. Fleming, C.B.E., M.Sc., director.

An Electrical Exhibition at Hereford

Considerable interest was taken in the electrical exhibition held last week by the Shropshire, Worcester and Staffordshire Electric Supply Co. at Hereford Shirehall. The chief exhibit, that of the S.W. & S. Co., consisted of the rooms of a house, furnished and equipped with electrical fittings. In the dining room tubular lighting was effectively displayed. Features of the bedroom were an electric blanket and an "alarm-clock-kettle-tea service" equipment. In the kitchen were ranges and cookers, including the "Utilo" cooker, which the company is installing free of charge. Cooking demonstrations were given each day. The scullery contained a "Hotpoint" washing machine, electric boilers and ironing appliances. In the centre of the hall were displayed various electric farming appliances, including pumps, bottle-washing machines, and a large incubator. Another miniature showroom contained a miscellaneous display of electrical appliances. The exhibition was supported by the company's Herefordshire service contractors, including Messrs. Rawlings & Co., Harding Bros., Rowberry & Son (Ross), Ltd., and the Wyeside Foundry, Ltd.

Works Visit

During the annual autumn meeting of the Institute of Chartered Accountants of England and Wales held in Manchester from October 11th to 13th inclusive, a visit was made by 285 members to the Trafford Park works of the Metropolitan-Vickers Electrical Co., Ltd. Amongst other manufacturing departments members of the Institute were conducted through the welding shops and the large manufacturing aisles for electrical equipment where the rapid advance and application of welded, fabricated parts both for rotors and stators were well illustrated. In particular the huge welded stator shells for the 75,000-kVA alternators for Fulham and the 105,000-kW alternators for Battersea were examined. Special interest was evinced in the Works Accounting Department. Two demonstrations were given in the laboratories of the company's Research Department, where both the million-volt power at 50 cycles and high-frequency discharge created great interest.

An E.D.A. Conference

The first sales conference of the winter session of the Mid-East England Area of E.D.A. was held in Bradford on October 10th, when a lecture was delivered by Mr. E. Rigby, of Callender's Cable & Construction Co., Ltd., on "The Manufacture of Rubber Insulated Cables." The lecturer dealt very fully with all stages in the manufacture of cables, from the bare copper to the finished article.

French Import Quotas

The French *Journal Officiel* has published a series of orders, dated September 29th, fixing the quotas for the import of a number of industrial products into France during the current quarter. We have abstracted from the *Board of Trade Journal* the amounts (in quintals) allotted to the United Kingdom, insofar as electrical material is concerned:—Dynamo-electric machines and industrial electric transformers, dry or in oil; dynamo-electric machines for motor vehicles except those combined with ignition apparatus; current rectifiers, 653; apparatus for cutting off, regulating, protecting and distributing electric current, including electric distribution tables; fitted up or not:—(*a*) non-automatic apparatus, 297; (*b*) automatic apparatus, 553; electric measuring apparatus, except meters covered by Tariff No. 505, 20; electric heating apparatus, including electric stoves, 38; vacuum cleaners, machines for waxing or applying polish, machines for cleaning footwear, 28; electric accumulators and parts, 347; wireless valves, 129; apparatus for wireless telegraphy and telephony, 248. The following quotas have been allotted for cables, but no division amongst the various supplying countries has been announced: Insulated wire and cable, 384; uninsulated wire and cable, 3,075 kg.

Electrical Manufacturing in the I.F.S.

Arrangements have been made for the establishment at Bray, Co. Wicklow, of a factory for the manufacture of electric lamps and electrical equipment. The factory buildings are now complete, and machinery obtained from Germany is about to be installed. It is anticipated that the factory will be capable of producing the major part of the electric-lamp demand of the Free State, about 2,000,000 per annum. The *Financial Times* states that it is understood that to finance the enterprise a share issue of £50,000 will be made next month.

Prices of Materials

Messrs. F. Smith & Co. report, October 17th: No change in the price of electrolytic copper bars, wire rods and h.c. wire and silicium bronze wire.

Messrs. James & Shakespeare report, October 17th: No change in the price of copper bars (best selected), sheet and rod and English pig lead. Electrolytic copper sheets, £28 10s. to £29 5s., 5s. dec.

Messrs. Edward Till & Co. report, October 17th: No change in the price of India-rubber, Para fine.

A Flying Visit to South Africa

Mr. George Ellison, junr., sales director of Messrs. George Ellison, Ltd., and his brother, Mr. Alfred Ellison, have just returned from a business air trip to South Africa. Mr. Alfred Ellison is the principal of the Black Lake Iron Foundry, West

Messrs. G. Ellison, Jun., and A. Ellison with the machine in which they flew to Johannesburg

Bromwich, which supplies Messrs. George Ellison with iron castings. Our picture shows the fliers immediately before they started from Castle Bromwich Aerodrome, Birmingham, on September 4th. The flight from England to the Cape was made in a D.H. Puss Moth, and the distance was 9,000 miles. Messrs. Ellison's branch office in Johannesburg was reached in a little over eight days. Even better time was made on first part of the return journey and there was a possibility of the record between South Africa and England being broken until desert sand and bad weather took a hand. Many days were saved, however, on both outward and return journeys as compared with the alternative means of transport.

For Sale

Newcastle-upon-Tyne Corporation:—One Belliss engine set direct coupled to a 20-kW generator, and switchgear. Islington Borough Cleansing Department:—Two a.c. motors, one generator, ten charging panels, and l.p. cable. Londonderry Electricity Department:—300 meters. (See our classified advertisements.)

A Guide to the I.E.E. Wiring Rules

In view of the large number of inquiries that have been received regarding the issue of an "Employé's Guide to the Tenth Edition of the I.E.E. Wiring Regulations for the Electrical Equipment of Buildings," the Association of Supervising Electrical Engineers has decided to publish a new handbook on the lines of that prepared for the previous edition of the Regulations. It is expected that the revised version of the Guide will be available before the end of the year.

An attractive display by the Corporation Electricity Department at the Brighter Homes Exhibition, King George's Hall, Blackburn, promoted by the Blackburn Chamber of Trade

Trade Announcements

The distribution of the "Mary Ann" electric vacuum cleaner for the North of England and Scotland, which has hitherto been in the hands of Messrs. H. C. Rawson (Sheffield & London), Ltd., Sheffield, is now being undertaken by British Electric Domestic Appliances, Ltd., 3, Hanover Court, Moor Lane, E.C.2, direct. Mr. L. Young, who has hitherto represented the latter company in the Eastern and Southern Counties, will now look after its interests in the North of England, and a depôt and branch office will be established for him shortly. In the meantime, the "Mary Ann" interests in Scotland are being looked after by Mr. J. Logan, 124, West Campbell Street, Glasgow. Mr. R. Rocky has been appointed as representative for the eastern and southern counties in place of Mr. Young.

Messrs. Falk, Stadelmann & Co., Ltd., have opened a depôt at 36, Aldermanbury, Bradford (telephone: Bradford 1905), where stocks will be carried of "Efesca" lighting and domestic appliances, "Hitest" cables, &c. The depôt will be under the supervision of the company's Leeds branch.

International Combustion, Ltd., announces that the amalgamation of the interests of the following companies in the parent concern have now been completed:—Underfeed Stoker Co., Combustion Steam Generator, Ltd., Mining & Industrial Equipment, Ltd., and Combustion Engineering, Ltd.

The telephone number of Straight-Lite Reflectors, Ltd., has been changed to Canonbury 2066.

New Catalogues and Lists

Sykes & Dyson, Ltd., Huddersfield.—Leaflets on the "Reliance" washing machine, wash-boiler and refrigerator.

M.K. Electric, Ltd., Wakefield Street, Edmonton.—A complete list of electrical accessories.

Lincoln Electric Co., Cleveland, Ohio.—Particulars of the "Shield-Arc" welder.

Switchgear & Cowans, Ltd., Elsinore Road, Old Trafford, Manchester, 16.—A leaflet on air-break gate-end starters.

J. Knight & Hale, Ltd., Victoria Works, Denton, Manchester.—A catalogue of "Bates" vertical Diesel oil engines.

M. & C. Switchgear, Ltd., Kelvinside Works, Kirkintilloch, Glasgow.—A leaflet on junction boxes for mine lighting service.

Medical Supply Association, Ltd., 167-173, Gray's Inn Road, W.C.1.—Booklets on electro-therapy apparatus and the "Medisun" lamp.

Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Road, E.C.1.—A booklet on neon signs made by Ionlite, Ltd.

Brightglow, Ltd., Oaklands Road, Cricklewood, N.W.2.—A leaflet on "Brightglow" fires.

Drake & Gorham Wholesale, Ltd., 77, Long Acre, London, W.C.2.—A catalogue of electric fires and radiators.

Gent & Co., Ltd., Faraday Works, Leicester.—A leaflet on "Electromatic" synchronous clocks and the "Tangent" watchman's electric tell-tale.

W. E. Beardsall & Co., Ltd., Victoria Bridge, Manchester.—A catalogue of glassware, "Selmo" reflectors, and electric fires.

British Insulated Cables, Ltd., Prescot.—Booklets on non-bleeding cables and a pole mounting fuse box.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—A new catalogue of glassware, imitation vellum and other shades.

Bankruptcy Proceedings

D. A. McD. Trew, 36, Binley Avenue, Binley, Coventry, lately 59, Primrose Hill Street, Coventry, trading as Trew Electrical Service, electrical dealer.—The receiving order herein was made recently on the debtor's own petition, when the statement of affairs filed showed ranking liabilities of £212, and there were assets of £19. Debtor attributes his failure to inexperience of business, bad trade and lack of capital. As a result of the first meeting held recently at the Official Receiver's offices, 9-11, High Street, Coventry, the case being a summary one was left in the hands of the Official Receiver, as trustee.

A. Parsons, 23, Clifton Crescent South, Rotherham, lately 25, High Street, Rotherham, electrician.—This debtor's application for discharge was heard on October 11th at the County Court Hall, Sheffield. The receiving order was made on the debtor's own petition in 1931. His liabilities amounted to £237. The judge said he would adjourn the application for six months.

H. C. Vanson, 35, Pasture Road, Goole, electrical engineer.—The public examination was held at the Court House, Wakefield, on October 11th. The gross liabilities were stated to be £195, of which £154 was expected to rank for dividend, and there was a deficiency of £82. Debtor attributed his failure to insufficient capital; bad trade due to depression in the local shipping industry; keen competition from multiple shops; and heavy overhead charges. The examination was concluded.

J. H. Dinham, "Anwylfan," Lanedarne Road, Llanishen, Glam., lately carrying on business in co-partnership with another under the style of the Electra Contracting Co., 50, New Zealand Road, Cardiff, and at 157, Richmond Road, Cardiff, electrical contractors.—The application for discharge herein was heard at the Law Courts, Cardiff, on October 10th. The receiving order was made early this year. The discharge was granted subject to one month's suspension.

J. D. Dickinson, 671, Chesterfield Road, Sheffield, wireless and electrical dealer.—The public examination was closed on October 11th at the County Court Hall, Sheffield, when there were disclosed liabilities of £312 and assets of £249.

T. S. Hanson, electrical contractor, 26, Nether Hall Road, Doncaster.—Last day for receiving proofs for dividend, October 24th. Trustee, Mr. L. J. Clegg, 14, Figtree Lane, Sheffield, Official Receiver.

H. Hillier-Brook, lately 1, Manchester Square, now 4, Market Street, Otley, Yorks, radio engineer. The public examination herein was held at the County Court House, Albion Place, Leeds, on October 9th, and was adjourned for formal closing. The statement of affairs showed a deficiency of £152.

V. O. Godolphin, electrical engineer, 8, The Leaze, Burford.—Receiving order made October 8th on debtor's own petition.

J. Mellanby, electrical engineer, Mystery House, Cambridge Road, Waterbeach.—Trustee, Mr. J. L. Wilkinson, 41, Sidney Street, Cambridge, Official Receiver, released October 4th.

C. J. Mount, electrical contractor, White House, East Acton Lane, W.—Last day for receiving proofs for dividend October 26th. Trustee, Mr. J. L. Poland, 29, Russell Square, W.C., Official Receiver.

Company Liquidations

Arthur for Wireless, Ltd., 70, Commercial Road, E.—The statement of affairs lodged under the compulsory liquidation of this company shows total liabilities of £2,103 (unsecured £1,689) and net assets of £64, after deducting £413 for payment of debentures and preferential claims. Mr. Naunton, Official Receiver (who is acting as liquidator) reports that the company was formed in May, 1933, with a capital of £100 to carry on business as manufacturers and retailers of wireless sets. A branch shop was opened at 4, Cambridge Road, E., in July, 1933, but was closed in January last. The company purchased from Harry Goldman the business he had carried on at Commercial Road as "A. Garrick & Co." and "Arthur for Wireless," and allotted him ninety-six shares representing the excess of assets over liabilities. Debentures for £400 were issued in August, 1933, to secure the repayment of loans, but the Official Receiver points out that the issue was *ultra vires* as the borrowing powers of the directors was limited to £100, the amount of the issued capital. On March 14th, 1934, Mr. B. S. Lane was appointed receiver for the debenture holders. He has sold the stock and office furniture and is realising the book debts, but does not anticipate that the assets will realise sufficient to satisfy the claims of the debenture holders in full. The failure of the company is attributed by Goldman to excessive allowances given on old wireless sets in exchange for new ones; to guarantees by the company in respect of hire purchase transactions; and to heavy overhead charges.

W. & F. Wills (London), Ltd.—Owing to a printer's error the name of this company was incorrectly given as W. & F. Willis (London), Ltd., in our last issue.

Dissolutions of Partnership

The Avenue Radio, wireless dealers, 280, Northfield Avenue, Ealing, W.—Messrs. F. A. E. Smith and C. A. Corke have dissolved partnership. Mr. Smith will attend to debts and carry on the business.

Lampitt & Elliott, wireless and electrical contractors, 8 & 95, Stratford Road, Wolverton, Bucks, and at Stoney Stratford.—Messrs. H. H. Lampitt and A. J. Elliott have dissolved partnership.

Gilbert Lewis Electrical Co., electrical contractors, 66, Douglas Road, Acocks Green, Birmingham.—Messrs. F. G. H. Lewis and P. J. Poncia have dissolved partnership. Mr. Lewis will attend to debts and carry on the business.

Electricity Supply

Lighting, Domestic, Power

Alston. — SUPPLY INAUGURATED. — Electricity has been switched on at Alston: it is taken from Penrith *via* a 11,000 V line which crosses Hartside, 1,900 ft. high.

Ampthill.—REDUCTION OF CHARGES.—The Rural District Council's efforts to secure a reduction in the percentage charges over the Luton rates for electricity in the Ampthill rural area has been successful. Under the new arrangement, which came into operation as from September 30th last, in one area the percentage charge is reduced from 25 to 17½, and in another from 33⅓ to 25. This represents a concession of approximately £2,000 to consumers. In reply to the Council's protest against the increased charges of the Bedford Corporation, which supplies part of the area, it was stated that these were made at the suggestion of the Electricity Commissioners, and that the Bedford Electricity Committee was unable to consider the question of imposing uniform charges throughout the area, doing away with the zones, or making any further amendment in the tariff. Consideration, however, would be given to the question of cooker rentals.

Barrow-in-Furness.—SUPPLY EXTENSION.—The Electricity Committee is to provide a supply to Ellers Mill in the Ulverston urban area.

Bedwellty.—CANVASS.—The Urban District Council has asked the electrical engineer to organise a canvass of probable consumers in Upper Trelyn, Pengam.

Burton-on-Trent.—REDUCED CHARGES.—The Corporation has reduced the kWh domestic charge under the two-part tariff to ½d., and the charge for power users has also been revised. It is just a year since the Corporation adopted the two-part tariff, with a charge of ¾d. per kWh.

SWITCHGEAR.—For supplying electricity to South Derbyshire switchgear costing £1,500 will be required.

Cardiff.—PROGRESS.—According to statistics that have just been issued by the Electricity Department, the city's electricity consumption has been as follows:—1894, nil; 1904, 7 million kWh; 1914, 12 million kWh; 1924, 24 million kWh; and 1934, 57 million kWh. Since the Electricity (Supply) Act, 1926, came into operation more than 20,000 local consumers have been financed by the department up to March last, the amount involved being £140,000. In the past thirteen years the undertaking has contributed no less than £277,510 towards the relief of rates.

Carlisle.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a total estimated cost of £6,800.

CHEAPER THEATRE LIGHTING.—The Electricity Committee recommends a reduction in the rate of supply to theatres and picture houses of ¾d. per kWh less on the lighting flat rate, or £1 5s. per kW less on the maximum demand rate for lighting.

Chorley.—REDUCED CHARGES.—The Lancashire Electric Power Co., has decided to reduce the flat rate supply charge from 6d. to 5d. per kWh, from the new year.

Colchester.—LOAN.—The City Council has applied for a loan of £1,995 for over-expenditure in connection with the additional plant at the Hythe generating station.

Coventry.—STREET LIGHTING.—The public lighting in Kenilworth Road is to be extended at a cost of £579.

Darlington.—TWO-PART TARIFF.—The Town Council is to adopt a two-part tariff for the sale of electricity to consumers in Blackwell and Croft Hurworth. At Blackwell the fixed charge ranges from 7s. 10d. per quarter for three rooms to 47s. 3d. for 15 rooms, while at Hurworth Croft the charge is 9s. 11d. for three rooms and 59s. 6d. for 15 rooms. The kWh charge is ¾d. in Blackwell and ¾d. in Croft Hurworth. For the ordinary tariff in Croft Hurworth the rate is to be reduced from 1d. per kWh to ¾d. during the eight lighter months and from 6d. to 5d. in the four darker months. The charge for electricity for lighting purposes in the village of Sadberge is to be reduced from 6½d. to 6d. per kWh.

Fareham.—HOSPITAL HEATING.—The Urban District Council has requested the electrical engineer to prepare estimates for the installation of a system of heating by electricity at the Isolation Hospital.

Finland.—HYDRO-ELECTRIC SCHEME.—Dredging operations at Keski and Rantakyla rapids in River Kymmene, are nearing completion, says *Reuters Trade Service*, quoting the Finnish *Paper and Timber Journal*. As a result, the head of the Myllykoski rapid will be considerably increased. In view of this the management of Yhtyneet Paperitehtaat O.Y. has decided to increase the capacity of the power station at Myllykoski in order to take advantage of all available water resources. The building scheme comprises the installation of new turbines and generators, which will be chiefly used for producing steam for the drying plant so as to reduce the consumption of fuel. When the present power station at Myllykoski was erected in the years 1926 to 1928 provision was made for a future increase in power capacity.

Formby.—NEW APPARATUS.—The Urban District Council has applied for a loan of £400 for replacing meters and other apparatus on consumers' premises, in connection with the bulk supply change-over.

FRINGE ORDER.—The Council has obtained a Fringe Order to give a supply to thirty-two houses being erected at Little Altcar.

France.—MARSEILLES.—L'Electricité de Marseille has recently finished the installation of the last of four new turbo-alternators at its Cap Pinède plant near Marseilles, states our Paris correspondent. These alternators, which are capable of producing 18,750 kVA at 5,000 V, are all installed in one room. The voltage is raised to 30,000 by transformers. The speed of the machine is 3,000 r.p.m., and steam is fed to it at 427 lb. and 750 deg. F.

Gillingham (Kent).—PROPOSED EXTENSION OF SUPPLY.—The Town Council has arranged for a further canvass to be made of the outlying areas of the borough with a view to supplying electricity. Owing to the high cost of affording such a supply the Electricity Committee had previously decided to take no action in the matter. The question of a reduction of charges is also being inquired into.

Hanbury (Worcester).—A SUPPLY WANTED.—The clerk to the Parish Council has been instructed to write to the Shropshire, Worcestershire and Staffordshire Electric Power Co., regarding the possibility of supplying the village with electricity.

Harwich.—REVISED CHARGES.—The Electricity Committee has recommended the following revised charges:—Fixed charge: The sum of £12 per annum, payable quarterly, per kW of lighting maximum demand, measured during the December quarter; minimum charge, £1 5s. per quarter. "Unit" charge: First 300 per quarter, 1½d. (winter) and 1d. (summer), all in addition at ¾d.

LOAN.—Sanction has been obtained to a loan of £1,000 for meters and £2,500 for mains and services.

India.—TRAVANCORE.—The Government of Travancore has created a hydro-electric department with a view to expediting the construction of hydro-electric projects in the State. Special attention is being given to popularising the use of electric power for industrial development, and in order to estimate the demand for power at the start, particulars are being gathered regarding new industrial undertakings, stafes our Bombay Correspondent.

London.—HACKNEY.—The Electricity Committee recommends that new terms be issued for the hiring out of domestic electrical apparatus and that sanction be obtained to the expenditure of £10,000 on such apparatus. The Committee has also suggested as an alternative tariff that where an electric cooker is used, electricity for lighting, heating and cooking for domestic purposes shall be supplied to private residences through a prepayment meter at a flat rate of 1d. per kWh, including the hire, installation and maintenance of the cooker. Where the wiring installation for lighting purposes is the property of the Council the rental would be ¼d. per kWh.

ST. PANCRAS.—The Electricity Committee recommends that consumers who are prepared to guarantee an annual payment of £663 in respect of a minimum demand of 50 kW should have the option of being charged at the existing scale of charges according to the actual maximum demand incurred by the consumer during the four winter months. The consumer would bear the cost of the necessary demand indicators.

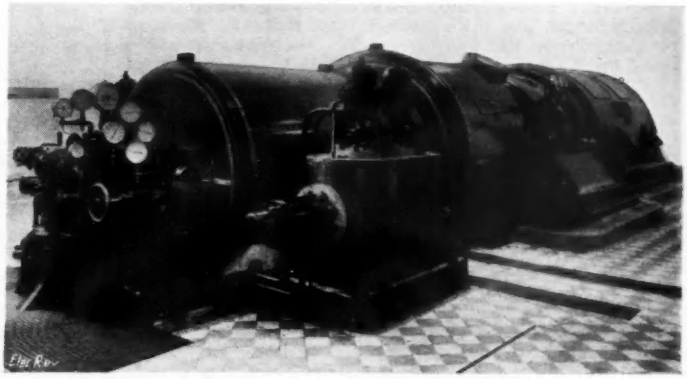
WANDSWORTH.—Substantial reductions in the flat rate charges for electricity for all purposes, particularly for light and power, are recommended by a special Electricity Committee of the Council.

Medbourne (Leicester).—SUPPLY ARRANGEMENTS.—The Hallaton Rural District Council has raised no objection to the erection by the Leicestershire and Warwickshire Electric Power Company of overhead lines from Slawton to Medbourne, and it is expected that a supply will be available to the latter village in a few months' time.

A fine example of floodlighting during recent celebrations in Milan, Italy

Mexico.—TERRADETS POWER STATION.—Good progress is being made with the construction of a new 45,600 h.p. hydro-electric power station at Terradets, for the Mexican Light & Power Co., and it is expected that the plant will be ready for operation early next year.

N.-W. Midlands.—REDUCED LIGHTING CHARGE.—The North-West Midlands Joint Electricity Authority has reduced the charge for lighting on the flat rate to 6½d. per kWh throughout its area.



The new turbo-alternator at Marseilles

New Zealand.—CHRISTCHURCH REPORT.—The 1933-34 report of Mr. E. Hitchcock, general manager of the electricity undertaking, shows a total revenue of £210,580, which is slightly higher than in 1932-33. The output increased considerably, and charges were reduced.

Newport (Mon).—REVISED CHARGES.—The charges for small industrial power have been lowered to 2d. per kWh for the first 1,000 kWh per quarter; to 1½d. for the next 10,000; to 1d. for the next 14,000; and to ½d. beyond 25,000.

Paisley.—PROPOSED ALTERNATIVE CHARGE.—The Electricity Advisory Committee has recommended the adoption of an alternative charge for domestic supply of a fixed annual charge, with a running charge of ½d. per kWh.

LOAN.—The Electricity Committee is to apply for a loan of £12,000 for meters.

Portsmouth.—EQUIPMENT OF AIRPORT.—The Corporation Docks and Airport Committee is to spend £5,240 on electrical and other equipment for the municipal airport. The equipment will include boundary markers (£1,160), obstruction lights (£2,380), wind direction indicator (£500), flashing beacon (£100), and a fixed three-lamp reflector sign (£600).

Walsall.—PROPOSED EXTENSIONS.—The Town Council has sanctioned expenditure of £1,935 for mains extensions to houses on the Fullbrook site, and bungalows in Bourne Vale, Streetly, and for the extension of supply at Essington and plant to give a bulk supply to works in Bath Street.

Warrington.—MAINS EXTENSIONS.—The Electricity Department is to lay an underground cable in Pool Lane, Statham, and to erect overhead lines near Agden Bridge.

Watford.—ANNUAL REPORT.—The report on the municipal undertaking for the year ended March 31st by the chief electrical engineer and manager (Mr. A. W. Barham) has just been issued. It shows that the number of consumers connected to the mains was 18,206, with a connected load of 54,097 kW, whereas at the end of the previous year there were 16,107 with a load of 47,820 kW. In spite of this, however, the amount of electricity sold only increased from 39,353,187 kWh to 40,541,655. The average price per kWh received was 0.91d. as compared with 0.94d. during the previous year. The amount of electricity sold for lighting and domestic purposes rose considerably, but this increase was practically counterbalanced by a drop in the power sales. Considerable increase has been made in the assisted-wiring schemes, and developments have taken place in the overhead line network in the Corporation's rural areas.

Wellingborough.—OVERHEAD CABLES.—The Minister of Transport has communicated to Wellingborough Urban District Council his decision in respect of the appeal by the Wellingborough Electric Supply Co., Ltd., against the refusal of the Council to consent to overhead wires. In the case of Harrowden Road the appeal of the company was dismissed. Regarding Brickhill Road and Nest Lane, the company was advised that it would be to its advantage to lay underground lines forthwith, but in the event of practical difficulties arising, the Minister was prepared to allow a temporary overhead line for a very limited period.

West Hartlepool.—ELECTRICITY CHARGES.—The Town Council has adopted a new scale for electricity charges. For the first 50 kWh per annum the charge will be 3d. per kWh; for the next 450, 2½d.; next 9,500, 1½d.; next 20,000, 1¼d.; next 30,000, 1¼d.; and above 60,000 at 1d.

Winchester.—LOANS SANCTIONED.—The City Council has received sanction to a loan of £13,000 for meters, and has applied for a loan of £7,000, the balance of a previous application, for mains in connection with the change-over.

Traction

Birmingham.—ADDITIONAL TROLLEY-BUS ROUTES.—The City Council proposes to apply for powers to operate trolley-buses on a number of new routes.

Germany.—NEW BAVARIAN CONVERSION.—The 30-mile Tubingen-Plochingen line of the German State Railways' Württemberg section has just been opened to electric traction, and is being worked by electric locomotives until the delivery of the motor coaches and trailers now on order. This branch joins the main Stuttgart-Augsburg electrified line at Plochingen, and a saving of twenty to thirty minutes in the journey time between Stuttgart and Tubingen has been effected by the electrification.

Hungary. — ELECTRIC LOCOMOTIVES. — Encouraging results have been obtained over a period of two years with the four original Kando phase-convertor locomotives on the Budapest-Hegyeshalom line, which is electrified. Although the route is only sixty-five miles long and no special repair facilities are provided, the four locomotives covered an aggregate of 410,000 miles up to the end of June last, the two passenger locomotives being responsible for 306,000 miles. The average mileage was adversely affected through serious damage to the traction motor stator of one of the two goods locomotives, caused by a short-circuit. This accounted for the machine being out of service for six months. During the first half of the present year, however, this particular unit ran 27,000 miles. The traction motors for these and the subsequent electric locomotives were built at the Trafford Park works of the Metropolitan-Vickers Electrical Co., Ltd. An interesting practical result of the operation of the Kando phase-convertor locomotives is that the contact wire voltage increases with the number of locomotives on the line.

Italy.—RAILWAY ELECTRIFICATION.—*Reuter's Trade Service* learns from Milan that the electrification of the Bolzano to Trento section of the Brenner railway has been completed and will be opened for traffic on October 28th.

Russia.—MORE FOREIGN-BUILT LOCOMOTIVES.—Four large double-bogie 3,000-V electric locomotives have just been built in Italy for service on the Soviet electrified lines round Magnitogorsk. They differ considerably from the seven locomotives sent out from Italy last year for the Perm railway, and also from the standard Soviet classes.

South Africa.—The Johannesburg Tramways Department is about to undertake the equipment of the tramways system with automatic and electrically controlled crossing points.

Sunderland.—EXTENSION.—The Town Council is to extend the tram track along the sea front to Seaburn at £35,000.

Traffic Signals.—ST. MARYLEBONE.—Further details are now available of the new system of traffic regulation at Marylebone referred to last week. The fifty-five intersections are to be equipped with "Autoflex" signals made by the Siemens and General Electric Railway Signal Co., Ltd. Fifty will be associated in a flexible progressive system in three groups, and the remaining five will be operated as isolated crossings and without reference to the main scheme. In the "Autoflex" system a number of local controllers are connected at predetermined intervals to a master controller, whereby the local controllers are checked or "brought into line" at least once during every cycle as determined by the master controller. By this means it is assured that the signals along the main thoroughfare are set to green to enable traffic to move through the main thoroughfare at a predetermined rate. Signals thus set to green on the main road will remain green indefinitely unless a demand for a change of right-of-way to a side road is received by the controller. The green signal will be transferred to the side road at the earliest possible moment compatible with safety, having regard to traffic movement in the main road, and to position within the total-cycle as determined by the master. The master and local controllers are capable of a large number of wide-range adjustments to permit varying conditions being met. The master controllers are mounted in duplicate with an automatic device which, in addition to switching in a stand-by controller, gives evidence of a breakdown or fault. The effects of modifications to the total cycle time are far-reaching, but considerable advantage is to be obtained by the use of special integrators to modify the total cycle time according to the state of the traffic.

Communications

Australia.—RADIO PICTURE TRANSMISSION.—The first picture to be transmitted by wireless from England to Australia was published in the Melbourne *Argus* on October 16th. The transmission took 25 minutes. This service, which is operated by Cables and Wireless, Ltd., and Amalgamated Wireless (Australasia), Ltd., is now available for public use.

India.—BROADCASTING.—Our Bombay correspondent reports that the Government of India has promised to issue a licence to the Allahabad Agricultural Institute for experimental purposes for the use of broadcasting for educational propaganda in villages. A transmitter is to be installed to work on a wavelength of approximately 300 metres and to deliver 100 W to the aerial. It is first proposed to address primarily those villages within fifty miles of Allahabad, some twenty-five receiving sets being distributed in as many villages. Though details of the programme have not been formulated, attention will be given to all phases of rural life. Entertainment will have a large but not a predominating place in the programmes.

Palestine. — RADIO-TELEPHONE SERVICE. — The Postmaster-General announces that the radio-telephone service between Britain and Palestine, which has hitherto been restricted to Jerusalem and certain of the other principal towns, is now available to all places in Palestine which are served by telephone. The charge for a call to Palestine from any place in England, Scotland, or Wales is £1 6s. a minute, with a minimum of £3 18s. for a call of three minutes.—*The Times.*

Scotland.—TELEPHONE CABLE.—A new trunk telephone cable between Elgin and Aberdeen which completes the substitution of an underground for the overhead system was opened on October 6th. The cable contains three lines, reserved for the use of the B.B.C. for broadcasting Regional programmes from the new North of Scotland station to be erected at Burghead, Elgin. The work of extending the underground system between Elgin and Inverness is to begin immediately.

Further Extension at Hams Hall, Birmingham

On Tuesday last the Birmingham City Council approved proposals submitted by the Electric Supply Committee for plant extensions at the Hams Hall power station. In July last the City Council gave the Committee authority to put in hand extensions to plant at the station, including main trunk lines and gear to sub-stations, at a total estimated cost of £1,054,100. This extension of plant was due to a "direction" from the Central Electricity Board backed with the approval of the Electricity Commissioners, and the Committee stated at the time that there were indications that further expansion would become necessary in the near future.

The "direction" provided for the installation of a 50,000-kW turbo-alternator, three large boilers with cooling tower and ancillary plant. Two of these boilers were required for steaming the new generating set, and the other for bringing into effective use a 30,000-kW turbo-alternator which was installed four years ago to facilitate progress of the frequency change programme. Concurrently with that "direction," the Board issued a second "direction" covering further extensions, viz., an additional 50,000-kW turbo-alternator with two large boilers and cooling tower, ancillary plant, and appreciable additions to the buildings to accommodate a further large generating set later. The position as to generating plant capacity was set out in a previous report, which showed that with the extensions then put forward and the displacement of the older, and less economical plant at Summer Lane and Nechells temporary power stations (by agreement with the Central Electricity Board) the capacity of the generating plant of the undertaking would be 248,000 kW.

The maximum demand on the system in the winter of 1932-33 was 177,000 kW, and in the winter of 1933-34 it had risen to 195,000 kW, in addition to which the Central Electricity Board called for a further 10,000 kW for export purposes, making a total demand of 205,000 kW. Since then the Board's requirements for export from the Hams Hall plant have considerably increased, whilst at a low estimate, taking all the calculable factors into account, the increment in the demand for Birmingham supplies might be put at 12,000 kW per annum.

The Committee explained that generating and ancillary plant of the nature described took approximately two years to become commercially effective, and it was therefore necessary to consider the position that was likely to arise in the winter of 1937.

It had, therefore, reached the definite conclusion that in order to meet the anticipated increased requirements, contracts for further extensions at Hams Hall power station should be placed immediately, and that effect should be given to the further "direction" received from the Central Board. In placing contracts already authorised, the Committee had made provision for securing certain financial advantages in the event of the additional plant now contemplated being included. Allowing for that and for the provision of main trunk feeders and sub-station gear, the total estimated expenditure involved was as follows:

	£
One 50,000-kW. turbo-alternator; two 250,000 lb. per hour evaporative capacity boilers; coal and ash handling plant, including pipework and valves	428,900
Buildings, foundations and civil engineering works, including cooling tower and pond, also railway sidings	365,400
Main switchgear, transformers and incidental cable work inside the station	125,000
Secondary switchgear and incidental work in the sub-stations...	10,000
Main trunk feeders from Hams Hall to the sub-stations ...	177,000
Total net estimated cost	£1,106,300
Add 5 per cent. for contingencies	55,300
Total, including contingencies	£1,161,600

The Committee recommended that, subject to all necessary consents being obtained, it be authorised to place contracts and proceed with the works referred to, and that the Finance Committee be instructed to apply to the Electricity Commissioners for sanction to borrow the sum of £1,161,600 in this connection, and to make provision for this as required from time to time.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Allendale.—Parish Council. Overhead network for the electric street lighting installation in Catton and Allendale. Plans by E. C. Lennox, North Eastern Electric Supply Co., Ltd., Carliol House, Newcastle-on-Tyne.

Argentina.—BUENOS AIRES.—Ministry of Public Works. November 30th. Hydro-electric plant. (A.Y. 12704.)*

Australia. — MELBOURNE. — November 29th. Metropolitan Tramways Board. P.i. l.c. cable. (A.Y. 12629.)* Traction sub-station units. (A.Y. 12623.)*

City Council. November 19th. Twenty-four ring-main switch units incorporating a transformer switch. (A.Y. 12675.)*

State Electricity Commission of Victoria. November 19th. Three oil-immersed, self-cooled transformers with spare coils and bushings. (A.Y. 12672.)*

December 10th. 6,600-V compound-filled circuit-breaker unit and accessories. (A.Y. 12700.)*

Posts and Telegraphs Department. December 18th. Automatic telephone switching equipment. (A.Y. 12663.)*

November 27th. Telephone switchboard indicators of various types. (A.Y. 12679.)*

November 20th. Jumper rings and terminal strips. (A.Y. 12685.)*

SYDNEY.—December 3rd. New South Wales Public Works Department. Hydro-electric plant in connection with the Burrinjuck water power development scheme. (A.Y. 12617.)*

Municipal Council. December 17th. 33,000-V and 11,000-V switchgear. (A.Y. 12703.)*

Ayr.—October 27th. County Council. Various works, including electric lighting, at Wallacetown Public school. Specifications from W. Reid, county architect, County Buildings.

Bolton.—October 23rd. Housing Department. Electrical installation in 102 houses and flats. (October 12th.)

Bridgend.—Electricity Department. October 23rd. Transformers, switchgear, h.p. cables and two transformer kiosks. (October 12th.)

Brighton.—November 6th. Corporation. Complete electrical installation at the Municipal Airport. (October 12th.)

Bristol.—November 2nd. Electricity Department. Four steam raising units. (See this issue.)

Burnley.—October 22nd. Electricity Department. Two 400-kVA 3-phase transformers. (October 5th.)

Buxton.—October 27th. Electricity Department. Iron-clad switchgear and 6.6-kV cable. (October 12th.)

Conway.—October 31st. Electricity Department. H.p. and l.p. cables. (See this issue.)

Darton.—November 3rd. Lighting installation at new senior school. Particulars from education officer, County Hall, Wakefield.

Eastbourne.—October 23rd. Electricity Department. Ventilation equipment in the central underground sub-station. (October 12th.)

East Grinstead.—October 20th. U.D.C. 6,600-V outdoor sub-station equipment, twelve months' supply of house meters, p.i., l.c. and armoured cables, glass-bulb mercury-arc rectifiers complete with transformers and e.h.p. switchgear. (October 5th.)

Ecuador.—QUITO.—November 13th. Municipality. Electric power plant (3,000 h.p.), street-lighting equipment, &c. (A.Y. 12589.)*

Egypt.—CAIRO.—Ministry of Public Works. November 12th. Power transformer. (A.Y. 12684.)*

November 15th. Mechanical and Electrical Department, Ministry of Public Works. Power house equipment at Gordon's Tree Dockyard. (G.Y. 14291.)*

November 12th. Two d.c. motor-driven centrifugal pumping sets and accessories. (G.Y. 14400.)*

Ministry of the Interior. November 17th. Material in connection with the overhead and underground networks at Chebin-el-Kanater. (A.Y. 12626.)*

November 10th. Material for the renewal and extension of the distribution system at Manfalout. (A.Y. 12636.)*

KHARTOUM.—December 13th. Public Works. Ministry in the Sudan. Electrical wiring materials for workshops at Gordon's Tree Dockyard. (A.Y. 12706.)*

India.—NEW DELHI.—November 7th. Stores Department. Fire alarm equipment. (A.Y. 12702.)*

London.—SOUTHWARK.—November 2nd. Borough Council. Cables for twelve months ending November 30th, 1935. (See this issue.)

Manchester.—October 31st. Electricity Department. Electric goods lift at the Polygon Depot, Ardwick. Specifications, &c., from H. C. Lamb, chief engineer and manager, Electricity Department, Town Hall; tenders to the chairman of the Electricity Committee, Town Hall (deposit £1 1s.).

Montrose.—October 24th. Town Council. Various works, including electrical, at thirty-two houses. Schedules from burgh surveyor; tenders to town clerk.

New Zealand.—WELLINGTON.—Posts and Telegraphs Department. December 5th. 200 lead-acid secondary cells. (A.Y. 12687.)*

Sleaford.—October 29th. Electricity Department. E.h.p. underground feeder, sub-station kiosk, switching and transformer, l.p. mains and distribution equipment. (October 12th.)

South Africa.—PORT ELIZABETH.—November 22nd. Municipality. Steam turbo-generator. (A.Y. 12678.)*

CAPE TOWN.—November 21st. Electricity Department. P.i., impregnated lead-sheathed, steel tape armoured cables. (A.Y. 12701.)*

Swansea.—October 22nd. Electricity Department. Apparatus for the remote and automatic control of four pulverised fuel-fired boilers, each having a rating of 240,000 lb. per hour, together with the necessary instruments, &c., Section "V," at the Tir John power station. Specifications, forms of tender, &c., from Preece, Cardew & Rider, consulting engineers, 8, Queen Anne's Gate, S.W.1 (deposit £2 2s.); tenders to H. L. Lang-Coath, town clerk, Town Hall, Swansea.

October 26th. E.h.p. and l.p. cables. Section "S," together with supports, pipes, trenching, &c., and the making of 400 cable boxes. (September 28th.)

November 8th. Electricity Department. One 10,000-kW turbo-alternator and accessories. (October 12th.)

Uruguay.—MONTEVIDEO.—November 26th. Supply and Telephones Administration. Metal filament lamps. (A.Y. 12670.)*

Watford.—November 5th. Electricity Department. Water-cooling tower. (See this issue.)

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* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Carlisle.—Housing Committee. Accepted. Wiring houses at Currock Estate (80).—W. Batey & Son; Raven Nook (28).—R. M. Hill & Son.

Darlington.—Town Council. Accepted. Cables.—Callender's Cable & Construction Co., Ltd.

Dewsbury.—Electricity Committee. Accepted. Joint and disconnecting boxes for twelve months.—W. T. Henley's Telegraph Works Co., Ltd.

Glasgow.—Cleansing Committee. Accepted. Battery for electric vehicle (£225).—Tudor Accumulator Co., Ltd. Three electric vehicles for refuse collection (£3,525).—Richard Garrett Engineering Works, Ltd.

Housing Committee. Accepted. Electrical work at premises in Trongate (£406).—J. Anderson & Co.

Transport Committee. Accepted. Copper trolley wire.—Whitecross Co., Ltd.; F. Smith & Co.

London.—EALING.—Education Committee. Accepted. Electrical wiring at schools.—Fullick & Loosley, Ltd. (£983); Harris & Gubbins (£335).

Electricity Committee. Recommended. Cables, &c., for 11,000-V ring main in Southern area (£4,114).—Enfield Cable Works, Ltd.

WESTMINSTER.—Traffic Committee. Recommended. Traffic signals (£5,389).—Automatic Electric Co., Ltd.

Finance Committee. Accepted. Electric wiring at Caxton Hall (£778).—Drake & Gorham, Ltd. This was the lowest of six tenders, the highest being £1,307.

Margate.—Education Committee. Accepted. Electric lighting at Salmestone schools (£116).—A. F. Dunkley & Co.

Middlesbrough.—Town Council. Accepted. Cable for extensions at Dixons Bank (£190).—Macintosh Cable Co., Ltd. Switchgear for four sub-stations.—General Electric Co., Ltd. Electric lighting at Marske School.—Graham Bros. Electric lighting and wiring of the West Lane cubicle block.—T. B. Watson.

Norwich.—Water Committee. Recommended. Electrical pumping plant at Heigham waterworks (£1,277).—Mather & Platt, Ltd.

Rotherham.—Health Committee. Accepted. Automatic telephones at isolation hospital (£107).—Automatic Electric Co., Ltd.

Swansea.—Electricity Committee. Recommended. Switchgear for Tir John power station (£33,614).—British Thomson-Houston Co., Ltd.

Uttoxeter.—Urban Council. Accepted. Plant for the transmission line to Denstone (£681), and a single switchboard cubicle (£106).—Johnson & Phillips, Ltd.

Warrington.—Electricity Committee. Accepted. Cables.—British Insulated Cables, Ltd. Conduits.—Doulton & Co., Ltd.; Albion Clay Co., Ltd. Cable slabs and service box covers.—S. H. Bonsall.

Winchester.—City Council. Accepted. Two 300-kVA transformers for sub-stations.—English Electric Co., Ltd.

Forthcoming Events

Institution of Electrical Engineers.—Thursday, October 25th. Institution, London. 6 p.m. Address by Professor W. M. Thornton. (*North-Eastern Students' Section*).—Friday, October 19th. Armstrong College, Newcastle-on-Tyne. 7.15 p.m. Address by Mr. E. C. Rippon. "Some Electrical Problems." (*Mersey and North Wales (Liverpool) Centre Students' Section*).—Tuesday, October 23rd. University, Liverpool. 7.30 p.m. Address by Mr. A. G. Shreeve. (*North Midland Centre*).—Tuesday, October 23rd. Queen's Hotel, Leeds. 7 p.m. Address by Prof. E. L. E. Wheatcroft. (*North-Western Centre*).—Tuesday, October 23rd. Engineers' Club, Manchester. 7.30 p.m. Address by Mr. G. A. Cheetham. (*Scottish Centre.*)—Tuesday, October 23rd. 39, Elmbank Crescent, Glasgow. 7.30 p.m. Address by Prof. F. G. Baily. (*Bristol Students' Section*).—Thursday, October 25th. Merchant Venturers' Technical College, Bristol. Students' lecture by Mr. C. C. Paterson. (*North-Western Students' Section*).—Saturday, October 27th. Grand Hotel, Manchester. 6.30 p.m. Annual dance. (*North-Eastern Centre*).—Monday, October 22nd. Armstrong College, Newcastle-upon-Tyne. 7 p.m. Address by Mr. L. E. Mold. (*Irish Centre (Dublin)*).—Thursday, October 25th. Physical

Laboratory, Dublin. 6 p.m. Address by Mr. R. G. Allen. (*East Midland Sub-Centre*).—Tuesday, October 23rd. The College, Loughborough. 6.45 p.m. "Electricity on Board Ship." Messrs. C. W. Saunders, H. W. Wilson, and R. G. Jakeman. (*West Wales (Swansea) Sub-Centre*).—Thursday, October 25th. University College, Swansea. 6.30 p.m. Chairman's address by Mr. R. G. Isaacs.

Birmingham Electric Club.—Friday, October 19th. Grand Hotel, Birmingham. 7 p.m. Ladies' night. Friday, October 26th. Grand Hotel, Birmingham. 7 p.m. "Traffic Control Signals." Mr. F. G. Tyack.

Diesel Engine Users' Association.—Wednesday, October 24th. Caxton Hall, S.W.1. 3 p.m. "Some New Developments in High-Speed Oil Engines." Mr. P. Belyavin.

Edinburgh Electrical Society.—Wednesday, October 24th. Philosophical Institute, Edinburgh. "Wiring Rules and Inspection." Mr. D. S. Munro.

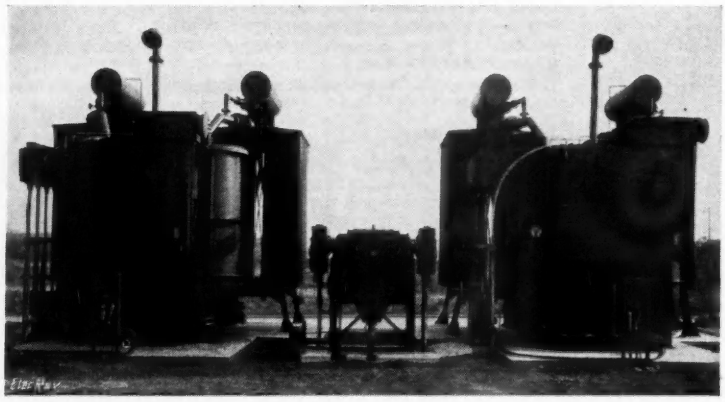
Electrical Association for Women.—Friday, October 26th. 20, Regent Street, S.W.1. 3 p.m. Meeting of London members. Formation of a London Branch.

Association of Supervising Electrical Engineers.—Saturday, October 27th. 2.30 p.m. Visit to the Bankside control room of the Central Electricity Board.

Notes

Openings on E.D.A. Staff

As will be seen from an advertisement appearing in this issue of the ELECTRICAL REVIEW the British Electrical Development Association is about to appoint specialists on heating development and building development respectively to its Head Office staff. This matter was referred to in our leading article on "What E.D.A. is Doing" (ELECTRICAL REVIEW, October 5th, page 431). Applicants of not more than thirty-five years of age are preferred. The salary will approximate to £500 per annum, and applications have to be sent in by October 27th.



English Electric transformers at the Blackburn Meadows station, Sheffield.

Yellow Traffic Control Globes

A British Standard Specification for internally illuminated yellow diffusing globes for traffic control signals has been prepared at the request of the Ministry of Transport. It deals with the material of the globe, its dimensions and thickness, limits for colour, and a test for ascertaining that the globe conforms to these limits. It requires that the filament shall not be visible when viewed in any direction from which the globe is normally seen, and lays down a test for the mean horizontal candle-power ratio of the globe, a figure for which is specified.

Copies of this Specification (No. 566-1934) can be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

The Manchester Electro-Harmonic Society

This Society will commence its sixteenth season with a smoking concert to be held this evening (Friday). This year it has again for its president Mr. A. Noel Smith, one of the principals of Messrs. Frederick Smith & Sons, who will occupy the chair at the first concert, and an interesting programme has been arranged. The venue of the meeting remains as last season, *i.e.*, the Waldorf Hotel, Manchester. The dates of other meetings are as follows:—November 23rd, December 21st, January 18th, February 15th and March 15th. The arrangements are in the hands of a Music Committee consisting of the following: Messrs. H. Jones (hon. secretary), L. Critch, J. Moores, J. D. Nettleton and H. R. Taylor. It has been decided that the ladies' evening shall be held on January 26th in the main hall of the "Manchester Limited" Restaurant, Manchester. Full particulars can be obtained from Mr. C. E. Leak, secretary, 10/12, Cateaton Street, Manchester.

Gresford Colliery Disaster Fund

Members of the Wrexham branches of the Wireless Retailers' Association and the Electrical Contractors' Association ask us to record their thanks to the following who generously responded to their appeal on behalf of the above fund: Metallic Seamless Tube Co., Ltd.; Eureka Vacuum Cleaner Co., Ltd.; Mullard Social and Athletic Club; M.K. Electric; Midland Electric Manufacturing Co., Ltd.; Bowden Bros. & Co. (Manchester), Ltd.; Crompton-Kye Lamp Sales, Ltd.; Crompton Parkinson, Ltd.; L. G. Hawkins & Co., Ltd.; Stearn Electric Co., Ltd.; Clegg, Highcock & Co.; Walsall Conduits, Ltd.; Erskine, Heap & Co., Ltd.; staff of E. W. Stockholm, Ltd.; Mr. Harold Somers (representing S. Eaton & Sons, Birmingham; Mrs. Thick; and others.

The Stratfordians' Association

The Stratfordians' Association (past and present staff of the Chief Mechanical Engineer's Department of the L.N.E.R., Stratford) will hold a re-union dinner in the Abercorn Rooms of the Great Eastern Hotel, Liverpool Street, on Friday, November 23rd, Mr. W. P. Stericker in the chair. Particulars can be obtained from the hon. secretary of the Association, Mr. A. W. Headley, C.M.E. Department, L.N.E.R., Stratford, London, E.15.

I.E.E. (South Midland Centre)

Mr. W. Burton will deliver his address as chairman of the South Midland Centre of the I.E.E., at the Grand Hotel, Birmingham, on October 17th. The annual dinner of the Centre will be held at the Grand Hotel on November 30th, and the Faraday Lecture by Prof. E. W. Marchant on "Electricity in the Life of To-day," will be given at the Birmingham Central Technical College, on February 28th. The annual meeting will be held at the James Watt Memorial Institute on April 8th.

A Steel Works Change-over

The two 20,000-kVA English Electric transformers installed at the Blackburn Meadows power station, to step up the supply from 11 kV to 33 kV for transmission to the works of Messrs. Thomas Firth and John Brown are three-phase core-type units, oil immersed with natural cooling provided by separate banks of radiators. On-load tap changing gear is provided on the 33 kV side to give 22 per cent. voltage variation in 14 steps. This equipment is automatically controlled and arranged to maintain constant voltage at the works irrespective of voltage variations at the power station and the load on the feeder. Provision is made for independent operation of the two units or for both units being operated synchronously. The transformer plant illustrated on p. 470 of our last issue is that at the Atlas Works of the consumers for stepping down the voltage from 33 kV to 6.6 kV, and is of Messrs. C. A. Parsons & Co.'s manufacture.

The Batti-Wallahs' Society

"Cosmic Rays" formed the subject of an address given by Professor P. M. S. Blackett, M.A., F.R.S., at the Batti-Wallahs' first luncheon of the season on Wednesday last, at the Hotel Metropole.

Finsbury Technical College Old Students

The annual dinner of the Finsbury Technical College Old Students' Association will be held at the Trocadero Restaurant on March 9th next. The Association holds informal dinners on the third Wednesday in each month during the winter months, and notices of these are sent to members on request.

Fatalities

A verdict of "Accidental death" was recorded at an inquest held on Thursday last week at Blaenavon into the deaths of Harold Leslie Cootes, aged twenty, a postman, and William John Bright, aged twenty-nine, an unemployed collier, who were killed by an electric shock while picking up broken telephone wires which lay across an electric cable in the rear of some houses in Blaenavon. A third man who went to their assistance also sustained a severe shock but has recovered. In recording the verdict the foreman of the jury stated that they were satisfied that the breaking of the telephone wires was caused by a bus striking the telephone post stay wire and not through any fault in the cable.

Overhead Aluminium Lines

The new edition of "Overhead Transmission Lines," published by the British Aluminium Co., Ltd., brings up to date the available information regarding the use of aluminium as a conductor for overhead transmission at high or low voltages. In addition to technical data regarding standard s.c.a. construction (including physical properties, sag calculations and comparison with copper), it gives particulars of the modifications used for spans up to 5,000 ft. in length, erection practice, and details of joints, clamps, and other accessories. Another recent publication by the same company is "Aluminium Sheet Metal Work," with especial reference to its use for electrical purposes.

Makers' Names Wanted

Pear push having a rotary movement suitable for operating three lights independently.

WINTON electric sweeper.

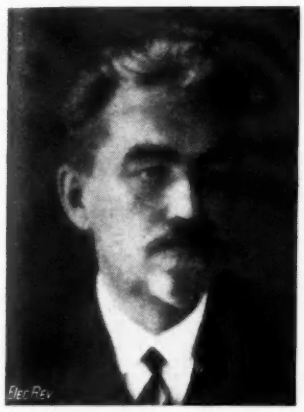
Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. Brian M. Burt has been appointed vice-president and chief engineer of Bepco, Ltd., which is a combination of the Canadian subsidiaries of Bruce Peebles & Co., Crompton Parkinson & Co., the Narland Engineering Co., and Lancashire Dynamo & Crypto, Ltd. Mr. Burt has hitherto been vice-president and Ontario manager. Mr. F. E. Regan has been appointed to the latter position.

Sir Allan Smith, chairman of the Engineering and Allied Employers' National Federation, has resigned on the grounds of ill-health. At a meeting of the General Council of the Federation held on Tuesday last Sir Allan's resignation was accepted with regret, and it was decided to appoint **Mr. Alexander Ramsay, M.P.,** as the Director of the Federation, on the approval by members of the Federation of certain alterations in the constitution necessitated by this appointment. Mr. Ramsay will not only be chairman of the management board but director of the Federation as well.

Mr. A. W. Winter, member of the Academy of Science, who is visiting this country during the current week, has built the largest electrical plants in the U.S.S.R. Amongst others, he has built the 150,000-h.p. Schatura steam-power plant which is the largest power plant in the world using brown coal. He has also built the largest hydro-electric plant in the world, the Dnieper plant in the south of Russia, which has a capacity of 550,000 h.p. He is now directing the erection of all the large water power plants in the U.S.S.R., principally the Volga, Kama, Tchirtchik (Central Asia) and Kram (Caucasus) undertakings. The total output of the water power plants which are being constructed in the U.S.S.R. during the current year is about a million kW. Mr. Winter is the president of the U.S.S.R. Committee which centralises all the Russian national committees of the various international bodies dealing with electrotechnics and production of energy, such as the I.E.C. and the World Power Conference. He has received the greatest Russian distinction, the Lenin Order.



Mr. A. W. Winter

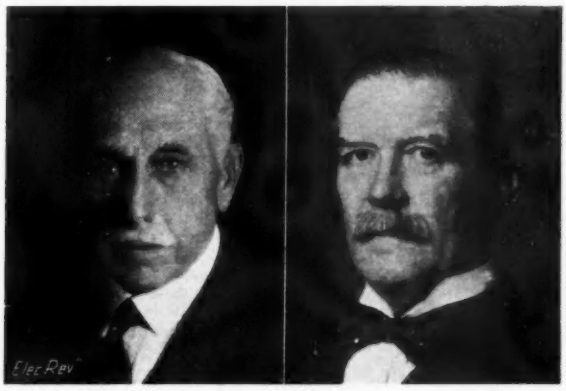
Mr. A. L. Paget, B.Sc., A.C.G.I., who has now joined the Electrical and Radio Publicity Service, was formerly with the British Thomson-Houston Co., and later research engineer with the General Electric Co. at Schenectady. Before returning to England he was with a New York advertising agency in charge of technical advertising.

Mr. R. G. Chinn has joined Messrs. Mortimer, Gall & Co., Ltd., in the capacity of sales representative.

Mr. F. M. Nicholl, M.I.E.E., M.I.Mech.E., has been appointed deputy commissioner of the Tasmanian Hydro-Electric Department with the particular duty of supervising construction of the new hydro-electric development on the upper Derwent River. According to the *Electrical Engineer and Merchandiser*, Mr. Nicholl was formerly deputy chief engineer and general manager of the Department, and subsequently held the appointments of city manager at Launceston, electrical sales manager to the Victorian Electricity Commission, and chief electrical engineer to Messrs. A. & T. Burt, Ltd., of Dunedin, N.Z.

Alderman C. A. Critchley, Mayor of Blackburn, inaugurating the new switchgear extensions at the Whitebirk station. On his left are Mr. Briggs Marsden (Town Clerk), and Mr. W. A. Royle (borough electrical engineer)

With reference to our note of last week (p. 498) regarding the changes in the board of the St. James' & Pall Mall Electric Light Co., Ltd., it should be added that the **Earl of Balfour** and **Mr. F. J. Walker** though retiring from their former positions will retain their seats on the board. Photographs of Mr. C. P. Sparks, C.B.E., M.Inst.C.E., a past president of the I.E.E., who is now chairman and acting managing director of the company, and Mr. Walker, accompany this paragraph. Mr. Walker was from the beginning of 1891 to 1912 general manager and secretary of the company, and in March of the latter year he became managing director, from which post he has now retired.



[*Elliott & Fry.*

Mr. F. J. Walker **Mr. C. P. Sparks**

Mr. C. C. Paterson, O.B.E., director of the Research Laboratories of the General Electric Co., Ltd., has accepted the invitation of the Council of the Junior Institution of Engineers to become president of the Institution in succession to Mr. W. J. Tennant, M.I.Mech.E. Mr. Paterson's induction will take place at a meeting to be held on December 14th at the Royal Society of Arts, Adelphi, and he will then deliver his address entitled "The Lighting of Streets and Roadways with Special Reference to Safety."

Mr. H. Herman has terminated his engagement as a director of Messrs. J. Segal, Ltd., and has commenced a wholesale business in electrical fittings and accessories on his own account at 65, Farringdon Road, E.C.

Sir Arthur Balfour, Bt., has joined the board of the Telegraph Construction & Maintenance Co., Ltd.

Mr. J. W. Tangye, assistant managing director of Tangyes, Ltd., of Birmingham, left England this week for a world business tour. He is first proceeding across Europe to the Near and Far East, and after calling at New Zealand, will travel to South America and other parts. He will be absent about fifteen months. The firm of Tangyes very early built up a world reputation as engineers and it is fitting that one bearing so well-known a name should go at the present important stage of our overseas trade, when every ounce of effort is essential for its development, to strengthen old and establish new British connections.

Obituary

Sir Arthur Schuster, Ph.D., F.R.S., Honorary Professor of Physics at Manchester University, who died on Sunday last at his home at Twyford, Berkshire, was born at Frankfort-on-Main in September, 1851, and was therefore eighty-three years of age. When his parents settled in Manchester he was eighteen years old, and for two years he followed a commercial career in his father's business as a merchant and banker, but in 1871 all such thoughts were thrown to the winds, and he went to Owens College and, later, to Heidelberg to study physics. For some time he was under Kirchhoff,

The late Sir Arthur Schuster, Ph.D., F.R.S.

who held the chair of physics at Heidelberg University, and later he was in Helmholtz's laboratory. The year 1876 found him at the Cavendish Laboratory, Cambridge, under Clerk-Maxwell, and, later, under Lord Rayleigh, assisting the latter in his work on electrical units. Between 1880 and 1890 Schuster conducted considerable research into the electric discharge in gases, a subject on which he delivered the Bakerian lectures. Terrestrial magnetism was also a subject coming within the special range of his studies. He was elected a Fellow of the Royal Society in 1879, and some years later was awarded a Royal Medal and the Rumford Medal. He was also one of the secretaries of the Society from 1912 to 1919. He was a very active worker in the interests of the British Association, and contributed largely to its proceedings. He was chairman of the Mathematical and Physical Science Section in 1892 and president of the Association in 1915. He was knighted in the year 1920. Latterly he had been handicapped in his work by the blindness of one eye. By his death we have lost one of a group of very eminent scientists of the 'eighties and 'nineties of last century who were famous for their original research and most of whom have passed on, leaving behind them the fruits of their endeavours as a permanent memorial in the general mass of scientific knowledge and achievement of to-day.

Herr E. Bohm.—The death is reported from Berlin, at the age of fifty-three years, of Herr E. Bohm, a leading German authority on switchgear. Born in Austria, the deceased was associated for some years with the Siemens-Schuckert and the Felten & Guillaume concerns; since 1919 he had been connected with the Bergmann Electrical Works, of Berlin.

Mr. E. Howl.—The death is announced at the age of eighty-six of Mr. Edmund Howl, of Sedgley, mining and mechanical engineer, and general manager of the South Staffordshire Mines Drainage Commission. He was a pioneer advocate of the application of electricity to industry in connection with the undertaking now known as the Midland Electric Corporation for Power Distribution, Ltd.

Mr. E. G. Denner.—The death occurred on October 13th, after a short illness, of Mr. Ernest George Denner, of Sheffield. Mr. Denner, who was seventy years of age, was born in London, and in 1895 went to Sheffield where he was employed by a firm of electrical contractors, and three years later he started in business for himself. He had been for many years prominently associated with the activities of the Electrical Contractors' Association. He was well known in the Sheffield district, and he is survived by a widow, three sons and a daughter.

Mr. W. J. T. Ivey.—The death is announced at the age of seventy-four of Mr. William John Thomas Ivey, who was a director of many companies, including the Sevenoaks Electricity Co., and the Chislehurst Electric Supply Co.

Mr. E. Baker.—Mr. Ernest Baker, a director of the United Flexible Metal Tubing Co. for some years and previously London representative of the company, died on October 13th.

Mr. J. P. Forster.—We regret to record the death of Mr. John Percival Forster, which occurred on October 13th at the age of forty-seven. Mr. Forster, who was a native of Durham City, received his early education there and later at St. Bee's, Cumberland. He entered Armstrong College, where he had a very distinguished career, graduating in 1907 with the Durham University B.Sc. degree in electrical engineering. After a short term with Messrs. Scott & Mountain of Gateshead-on-Tyne, he entered the engineering offices of the North Eastern Railway Co., at York. In 1911, he obtained an appointment with Messrs. Bolckow Vaughan & Co. as electrical inspector for their collieries in the Bishop Auckland area, being subsequently appointed electrical engineer and later chief engineer for the same group. He continued to hold the last-named appointment until June, 1928, when he joined the staff of the Newcastle-upon-Tyne Electric Supply Co., Ltd. (now the North-Eastern Electric Supply Co., Ltd.). For the last few years, Mr. Forster had been in charge of the Mines Department of that company. He was a member of the Institution of Electrical Engineers, and of the Association of Mining Electrical Engineers. He is survived by a widow and two sons and one daughter.

Mr. A. Rashleigh Phipps.—We regret to record the death of Mr. Alwyn Rashleigh Phipps, which occurred on October 15th following a short illness. Mr. Rashleigh Phipps was the governing director of the firm of Rashleigh Phipps & Co., Ltd., electrical engineers, of Hanover Square, W.1, which was founded in 1892. During the last forty years both he and his company have been very prominently connected with the electrical industry. The business is being carried on under the direction of Mr. J. M. Crowdy.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Wm. Sanders & Co. (Wednesbury), Ltd.—Private company. Registered October 5th. Capital, £25,000 in £1 shares. Objects: To acquire the business of an electrical engineer carried on by W. Preston at Falcon Works, Ridding Lane, Wednesbury, Staffs, as Wm. Sanders & Co., and to carry on business as manufacturers, repairers, exporters and importers of and dealers in electrical switchgear, switchboards and control gear of every description, dynamos, motors, armatures, magnetos, batteries, conductors, insulators, refrigerators, cold storage plant and machinery, fans, stoves, fires, cookers, bells, clocks, radio and television instruments, sets and components, &c. The first directors are: W. Preston and Mrs. L. S. Preston, both of Byelanes, Gorway Road, Walsall, Staffs. Registered office: Falcon Electrical Works, Ridding Lane, Wednesbury, Staffs.

S. W. Cohen, Ltd.—Private company. Registered in Edinburgh October 9th. Capital, £10,000 in £1 shares. Objects: To carry on the business of radio and musical instrument factors, manufacturers, importers and exporters of, wholesale and retail dealers in and agents for wireless and television sets, &c. The first directors are: S. W. Cohen and Mrs. B. Cohen, both of 4, Dalkeith Avenue, Glasgow, S.1.

George O'Kill & Co., Ltd.—Private company. Registered October 10th. Capital, £1,000 in £1 shares. Objects: To carry on the business of dealers in and merchants of electrical appliances and apparatus, electricians, electrical, mechanical, civil, marine and general engineers, &c. The subscribers are: G. E. T. O'Kill, Headingley, Old Claygate Lane, Hinchley Wood, Surrey, and C. W. Adkin, Windsor House, Kingsway, W.C.2. G. E. T. O'Kill is governing director. Registered office: 3, Arundel Street, W.C.2.

Electrical Services (Erith), Ltd.—Private company. Registered October 11th. Capital, £1,500 in £1 shares (500 10 per cent. (free of tax) cumulative preference and 1,000 ordinary). Objects: To acquire the business of an electrical engineer now carried on by Charles E. Vevers at 353, Bexley Road, Northumberland Heath, Erith, and 196, Woolwich Road, Bexley Heath, Kent, as "The District Electrical Service." The first directors are: C. E. Vevers (permanent managing director and chairman), and two others. Secretary: C. E. Vevers.

Initial Radio Service, Ltd.—Private company. Registered October 12th. Capital, £1,000 in £1 shares. Objects: To carry on the business of hirers for rental of all kinds of wireless receivers, manufacturers of and dealers in all kinds of wireless, electrical, scientific, and mechanical devices, electrical contractors, &c. The first directors are: S. E. Boyd, 7, St. Hilda's Road, St. Annes-on-Sea, and two others. Registered office: 12, Park Street, Lytham, Lytham St. Annes.

United Ebonite Manufacturers, Ltd.—Private company. Registered October 11th. Nominal capital, £50,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in ebonite, chemists, mine owners, electrical and mechanical engineers, manufacturers and distributors of electricity, manufacturers of and dealers in natural and artificial rubber, cork, leather, vulcanite, mica and celluloid and like substances. The subscribers are: F. A. Jones, 28, Ryde Vale Road, S.W.12, and F. W. Eve, 5, Christ Church Mount, Epsom. Solicitors: Mawby & Barrie, 55/61, Moorgate, E.C.2.

Treve Radio Relay, Ltd.—Private company. Registered October 10th. Capital, £3,000 in £1 shares. Objects: To acquire the business of a radio relay owner-operator, carried on by Harold Harding, at Ebbw Vale, Mon. The subscribers are: H. Harding and Mrs. G. Harding, both of Libanus Road, Ebbw Vale, Mon. H. Harding signs as director. Solicitor: W. A. Jones, Ebbw Vale.

Butterworth & Robinson, Ltd.—Private company. Registered October 10th. Capital, £1,000 in £1 shares. Objects: To acquire the business of electricians, wireless engineers and dealers, in electrical fittings and accessories, now carried on as "Butterworth & Robinson," at 20, Bold Street, Southport. The permanent directors are: A. B. Butterworth and Mrs. E. Butterworth, both of 78, Grange Road, Southport. Registered office: 20, Bold Street, Southport.

Returns of Electrical Companies

Cutting Bros. & Co., Ltd.—C. J. Pain, 18, Low Pavement, Nottingham, ceased to act as receiver and manager on October 4th, 1934.

Universal Wireless Relay, Ltd.—The nominal capital has been increased by the addition of £8,000 beyond the registered capital of £12,000. The additional capital is divided into 8,000 preferred ordinary shares of £1 each.

Bedford & District Electric Supply Co., Ltd.—Capital, £100,000 in £1 shares. Return dated May 11th, 1934. 80,000 shares taken up. £80,000 paid. Mortgages and charges: £1,179 10s. 10d. bank overdraft, and £4,000 on loan from West of England Electric Investments, Ltd., at 3½ per cent. repayable on demand.

Electric Furnace Co., Ltd.—Capital, £200,000 in 100,000 ordinary and 100,000 preferred ordinary shares of £1. Return dated July 4th, 1934. 78,036 ordinary and 85,207 preferred ordinary shares taken up. £19,243 paid on 6,036 ordinary and 13,027 preferred ordinary, £144,000 considered as paid on the remainder. Mortgages and charges, nil.

Mid-Lincolnshire Electric Supply Co., Ltd.—Capital, £200,000 in 100,000 preference and 100,000 ordinary shares of £1. Return dated July 4th, 1934. All shares taken up. £95,000 paid on 95,000 ordinary shares, £105,000 considered as paid on 100,000 preference and 5,000 ordinary shares. Mortgages and charges. nil.

New Radnor Electric, Ltd.—Capital, £650 in £1 shares. Return dated July 5th, 1934. 632 shares taken up. £600 paid, £32 considered as paid. Mortgages and charges, nil.

C. T. Briscoe & Son, Ltd.—Capital, £5,000 in £1 shares. Return dated July 19th, 1934. 2,750 shares taken up. £860 paid. £1,890 considered as paid. Mortgages and charges, nil.

National Electric Construction Co., Ltd.—Capital, £185,000 in 10s. shares. Return dated July 26th, 1934. All shares taken up. £175,574 10s. paid on 351,149 shares, £9,425 10s. considered as paid on 18,851 shares. Mortgages and charges: £75,893 16s. 9d.

Premier Accumulator Co. (1921), Ltd.—Capital, £40,000 in £1 shares. Return dated July 27th, 1934. All shares taken up. £13,749 paid (£1 per share on 11,249 and 15s. per share on 10,000 shares), £18,751 considered as paid on 18,751 shares. Mortgages and charges nil.

Gravesend Welding & Electrical Engineering Works, Ltd.—Capital, £5,000 in £1 shares. Return dated August 14th, 1933 (filed May 4th, 1934). 4,000 shares taken up. £1,000 paid, £3,000 considered as paid. Mortgages and charges nil.

Kniveton Cable Works, Ltd.—Particulars filed of £2,000 debentures authorised September 5th, 1934, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £300.

Plew Television, Ltd.—H. L. Ward, 52, Bedford Square, W.C.1. was appointed receiver and manager on October 8th, 1934, under powers contained in debenture dated August 25th, 1934.

Weston-super-Mare and District Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £30,000 in £1 ordinary shares beyond the registered capital of £150,000.

City Notes

Utilities Power & Light Corporation (Virginia).—This company, which controls (*inter alia*) Greater London & Counties Trust, Ltd., Edmundson's Electricity Corporation and the Shropshire, Worcestershire & Staffordshire Electric Power Co., states in its quarterly report that the gross operating revenue for the year to the end of June increased by $2,260,852 to $49,899,816. Operating expenses rose by $2,116,616 to $33,932,150. According to the *Financial Times* the sales of electricity and gas by the American subsidiaries during the twelve months ended June 30th exceeded the sales during the year ended December 31st, 1933, by 5.41 and 6.45 per cent. respectively, but increases in taxes and operating costs prevented an increase in the net operating income. The net operating income of the British subsidiaries on a comparable basis increased by 7.86 per cent. The following table is a condensed comparison of the consolidated earnings statement of this quarterly report with that of the annual report for 1933:—

	1933.	1934.
Net operating income	$15,823,431	$15,967,666
Non-operating income	409,541	543,041
Fixed charges, divs. on pref. stocks of subsidiaries, etc.	13,143,522	13,393,984
Net income of public utility subs. ...	3,089,450	3,116,723
Net income of company	237,675	219,004
Deb. interest, other int., etc.	2,889,324	2,879,034
Total net income...	437,801	456,684

On June 30th the consolidated current assets of the American companies were $15,569,975, against current liabilities of $6,770,350. The consolidated current assets of the British companies were £2,200,944, against current liabilities of £608,890.

The Greater London & Counties Trust, Ltd., in its consolidated statement for the year ended June 30th last shows a gross operating revenue of £4,479,912. Operating expenses were £2,680,758, maintenance £190,051, taxes (exclusive of income tax) £152,212, and depreciation £456,145, leaving a net operating income of £1,000,745. The *Financial Times* states that non-operating income was £137,397, less expenses, interest, directors' fees, &c. (£87,353). Interest on funded debt was £292,576 (less amount capitalised by Shropshire, Worcestershire and Staffordshire Electric Power Co., £31,212), interest on unfunded debt £11,785, other charges £2,503, and income tax £102,799, leaving £672,335. Dividends on preferred shares of subsidiary and controlled companies amount to £270,445; surplus net income of properties prior to acquisition is £150, and net income accruing to minority interests £144,564. The net consolidated income is therefore £257,174 (an increase of £34,774 since March 31st last).

Electro-Chemical Processes, Ltd., reports a net loss for the year ended March 31st last of £6,344, as against £10,065 for the previous year. This increases the debit balance to £105,938. The directors state that the most urgent concern at present is to ensure the provision of sufficient working capital to enable the colloidal products department to be carried on until it can reap the full benefit of the work which has been done by its technical staff and sales organisation. The financing of the slack season, and stocks required in the colloidal department have locked up a substantial amount of money. The directors have opened up negotiations with a view to meeting the situation, but should these negotiations prove abortive, they may find it necessary to raise further working capital on terms which will possibly involve a drastic reconstruction. No steps in this connection will be taken until after consultation with the preference shareholders' standing committee.

Companies to be Struck Off the Register.—The names of the following companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary:—Associated Radio Productions, Ltd.; Brockley Radio, Ltd.; Clifford Radio Corporation, Ltd.; Compton Radio Wholesalers, Ltd.; Cowcross Radio, Ltd.; Davidson Radio Co., Ltd.; Duo-Mains Radio, Ltd.; Eldon Wireless Co., Ltd.; Envoy Electrical Storage, Ltd.; Etna Radio Manufacturing Co., Ltd.; Finchley Electrical Co., Ltd.; Hampstead Radio, Ltd.; Howard Radio, Ltd.; Kingsway Electrical Products, Ltd.; Lamberhurst Electric Supply, Ltd.; Modern Electrical Installation & Maintenance Co., Ltd.; Piccadilly Radio Co., Ltd.; Radio Equipment Co., Ltd.; Vernon Electrical Co., Ltd.; Welsh Radio and Electrical Supplies, Ltd.; Wemradio, Ltd.

The Metropolitan-Cammell Carriage Wagon and Finance Co., Ltd., has decided to reorganise its capital. An extraordinary general meeting is to be held on October 31st, so that a new company may be formed, the present company being put into voluntary liquidation as a mere formality. The new company will be named Metropolitan-Cammell Carriage & Wagon Co., Ltd., and will take over the business, property and assets of the existing company, and will discharge all liabilities existing at the date of transfer and will carry on the business as before. The capital of the new company will be held by the present shareholders in the existing company, viz., Vickers, Ltd., and Cammell, Laird & Co., Ltd.

John Shaw & Sons, Wolverhampton, Ltd., report a net loss for the year ended June 30th of £369, as compared with a loss of £57,420 in the preceding year. The deficiency account is increased by £5,601 to £220,559, including the loss for the year and further reservations which the directors have been forced to make in the process of realisation and clarification of the financial position. The report states that unforeseen difficulties, now in great measure dissipated, have prevented the completion of reorganisation and plans have been modified. Considerable progress has been made by way of reducing stocks and realising contracts. Meeting: October 23rd, at Wolverhampton.

The International Automatic Telephone Co. announces that the options granted some years ago by the company to Theodore Gary & Co. of Kansas City, Missouri, to subscribe, if, as, and when issued 290,000 ordinary shares of the I.A.T. Co. of £1 each at 30s. each and 170,338 7 per cent. cumulative preference shares of £1 each at 21s. 6d. each have been cancelled by mutual consent. No new issues of shares are contemplated at present.

Central Board Loan.—This week the Central Electricity Board was arranging the underwriting of an issue of £6,000,000 of 3¼ per cent. stock at 93. The last issue was made in June last year, when £8,000,000 of 3½ per cent. stock was offered at 93½.

The Calcutta Electric Supply Corporation, Ltd., has declared an interim dividend on the ordinary shares of 5 per cent., tax free.

The Oriental Telephone & Electric Co., Ltd., has announced an interim ordinary dividend of 4 per cent., tax free (unchanged).

The River Plate Electricity Co., Ltd., has announced an interim dividend of 3 per cent. on the ordinary shares (unchanged).

Callender's Cable & Construction Co., Ltd., is maintaining its interim ordinary dividend at 5 per cent.

The Shanghai Electric Construction Co. has declared an interim dividend of 4 per cent.

Babcock & Wilcox, Ltd., have declared an interim ordinary dividend of 4 per cent. (against 3 per cent.)

Stocks and Shares

TUESDAY EVENING.

THE ready way in which investment is taking new issues which are offered at however high a price, but with good security at the back of them, makes renewed evidence of the abundance of money still available for employment in Stock Exchange securities. Although the volume of general business is less than, a couple of months ago, it had been expected to prove after the holidays, the general tendency of prices is decidedly strong. People are rather afraid of the price to which gold, the metal, has attained, and in view of the continued unsettlement on the Continent, money is seeking, at the moment, the shelter of purely gilt-edged stocks, and of the best-class shares in the Industrial groups. A curious commentary upon the tendency of the times is furnished by a request made by shareholders in a rubber company with a small amount of uncalled capital that the liability should be called up by the directors. The board, on their part, are reluctant to do this, by reason of the fact that the company is in no want of funds at present, and the directors frankly admit they would hardly know what to do with the money if they called it up.

Public Boards' Stocks

No changes have occurred in the prices of Central Electricity stocks. It is to be noted, however, that the pressure of demand is still so considerable that the amount of stock available for purchase in the market is comparatively trifling. In some of the issues there is scarcely any to be obtained. Central Electricity fives of 1950-1970 can be bought at 114½, to give £4 7s. 6d. per cent. outright, and £3 13s. 6d. per cent. assuming that the stock should be paid off at 100 at the earlier of the two years mentioned. Of the Central Electricity 3½ per cent. stock there is £10,000 on offer at 101¼. This yields £3 9s. 6d. per cent., the redemption return being the same as the running yield. Interest payments are due, in the latter case, on the 1st of June and December: in the former, on the 1st of March and September. Both stocks are subject to Government stamp duty of 1 per cent. The London and Home Counties Joint Electricity Authority, in its report to the end of March last, mentions that £624,928 was expended in capital extensions of undertakings already acquired. The accumulated net deficit is returned at £24,912. Nevertheless, the 4½ per cent. stock has risen 2 points to 112. London Passenger "C" is firmer at 86¼.

Electricity Supply Shares

The increase in the number of units of electricity generated in Great Britain for the first nine months of this year, as compared with the same period of 1933, came to 16 per cent.—twice as much, that is to say, as the increase for the same period of 1933 over 1932. Prices of Home electricity supply shares keep firm. Quotable changes are few and negligible. Gains of a few pence each have been secured by Clyde Valley, Electrical Distribution of Yorkshire, North Easterns and York-

shire Electric. Two or three of these improvements are more nominal than actual, being due to a slight narrowing of the official prices quoted in the Stock Exchange lists. This change is in the right direction, but has not been carried nearly far enough to make it of practical value. A margin of 2s. between the selling and buying prices in, for example, Electrical Distribution of Yorkshire ordinary, offers little encouragement to investors who like to feel their money is in shares that are readily negotiable, and to whom the current official quotation implies that the market is a narrow one. In Midland Counties Electric ordinary there is an official difference of 2s. between the selling and buying prices. In Midland Electric Corporation for Power Distribution the difference is 2s. 6d. So might examples be multiplied of quotations whose narrowing would give the public a more correct idea of the market price of shares, and, at the same time remove any impression that, by reason of wide prices, the market is extremely limited. In actual dealing, the margin is, of course, usually much less.

Manufacturing and Equipment

Aron Electricity have provided one of the features of the week with a jump of 6s. 3d. to 3½, accompanied by a good deal of business. Telegraph Constructions put on 5s., with a rise to 25s., it being argued that the shares have been overlooked in the recent demand for others in companies dealing with similar work. Rises of ⅛ have taken British Insulated to 76s. 3d., Callenders to 67s. 6d., and Henleys to 6¼. Henley's preference are 5s. higher at 5¾. Brush ordinary slipped back a couple of points after its recent substantial recovery. Enfield Cables rose abruptly to 4⅝, demand being very insistent. Johnson & Phillips eased off to 30s. International Automatics are a little better at 38s. 6d. The directors announce that the options granted some years ago by the company to Theodore Gary & Company, Kansas City, Missouri, have been cancelled by mutual consent. The company's "B" deferred shares are unchanged at 36s. 9d. Enfield Rolling Mills keep steady at 26s. Telephone Rentals strengthened to 8s. 9d. Siemens 4½ per cent. debenture is better at 103. Offers have been invited for the Telsen Electric Company's business as a going concern. The nominal price of the shares is about 5s.

Cables and Wireless

Improvements have occurred in the preference and the "A" ordinary stocks of Cables & Wireless, without, however, leading to any particular increase of business. The September returns published by the Board of Trade created a good impression, the increases, both in exports and in imports, being used as arguments in favour of the impression that trade throughout the world is showing signs of improvement. Opinion respecting the United States is undergoing a change. Pessimism is being replaced, very slowly, by a more cheerful (or less doleful) sentiment. Private advices from the States, and the reports which Americans now in London present of prevailing conditions on the other side, imply that America is getting once more on her financial feet.

American Telephone and Telegraph stock has gained a couple of points at 114½. Internationals are changing hands on the basis of 10. No movements have occurred in Globe Telegraphs and Trusts. Canadian Marconis are better at 9s. 6d.

Colonial and Foreign

Calcutta Electric Supply shares have advanced, on the announcement that the usual 5 per cent. interim dividend will be paid this time free of tax, instead of being gross. The shares rose to 63s. 6d., to go back later, however, to 61s. 9d. Anglo-Argentine Tramway stocks are weak. The 4 per cent. debenture has dropped to 20½, the 5 per cent. debenture to 6. The two classes of preference shares remain at the nominal price of 1s. 6d. Postal Telegraph 5 per cent. debenture stock has gone back to 45½. River Plate ordinary stock has been a good market, with a rise to 200. Perak 7 per cent. debenture at 45 shows a drop of 2. There has been a little inquiry for Barcelona 6½ per cent. prior lien bonds, and the price responded with a rise of 3 to 96½. Brazilian Tractions have been a somewhat erratic market, revolving narrowly around 12. Tokyo sixes are steady at 84.

Miscellaneous Matters

Atlas shares at 7s. 4½d. have gone back a few halfpence, while British Power & Light retain their previous price at 20s. 4½d. Babcock & Wilcox have announced an interim dividend of 4 per cent. on the ordinary shares, which is an improvement of 1 per cent. over the corresponding period of 1933, for the whole of which year the ordinary dividend was 6 per cent. This compared with 9 per cent. in the previous twelve months, but from the now declared increase in the interim dividend it is reasonable to look for an advance to 7 or 8 per cent. in respect of the current year. The price of the shares is unchanged at 43s. 6d. The General Gas and Electricity Company has published a statement, for public information, of an issue of 35,000 5 per cent. redeemable £1 preference shares, and £40,000 of 4½ per cent. redeemable debenture stock. There will be, no doubt, a market in these shares at an early date. The rubber share market is still awaiting developments. The price of the produce, after dropping to 6 11/16d. per lb., rallied to 7d. per lb., without, however, leading to any noticeable increase in public interest. Electric Finance & Securities at 65s. are 1s. better.

Share List of Electrical Companies

	Nom.	Dividend 1932.	Dividend 1933.	Price. Oct. 16.	Rise or Fall.	Yield. p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	78/9	—	3 16 2
Brompton Ordinary	1	7	7	34/6	—	4 1 2
Charing Cross Ordinary	1	7	7	35/-	—	4 0 0
Chelsea	1	7	7	34/6	—	4 1 2
City of London	1	7½	7½	36/-	-3d.	4 3 4
Clyde Valley	1	7	7	39/6	+9d.	3 10 10
County of London	1	10½	10½	57/6	—	3 13 1
Edmundson's 7% Pref.	1	7	7	35/-	—	4 0 0
Elec. Dis. Yorkshire	1	9	9	49/-	+3d.	3 13 6
Elec. Supply Corporation	1	11	11	58/9	—	3 14 10
Kensington Ordinary	1	7	7	34/6	—	4 1 2
Lancs Light and Power	1	7	7½	37/6	—	4 0 0
London Electric	1	7	7	34/6	—	4 1 2
Metropolitan	1	10	10	53/6	-3d.	3 15 6
Midland Counties	1	7	7	37/6	—	3 14 8
Mid. Elec. Power	1	8	8	43/9	—	3 13 2
North Eastern Electric Ordinary	1	6	6	33/6	+6d.	3 11 8
Do. 7% Pref.	1	7	7	35/-	—	4 0 0
Northampton	1	10	10	55/-	—	3 12 9
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 4
North Met. Elec. Ordinary	1	10	10	3½	—	3 1 6
Do. do. 6% Pref.	1	6	6	32/-	—	3 16 2
St. James' and Pall Mall	1	7	7½	36/6	—	4 2 2
Scottish Power	1	8	8	41/6	—	3 17 2
South London	1	7	7	35/6	—	3 19 0
Westminster Ordinary	1	7	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/-	—	6 16 4
Yorkshire Elec.	1	8	8	46/6	+3d.	3 8 8
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	115	—	4 7 0
Do. 1955–75	,,	5	5	117	—	4 5 6
Do. 1951–73	,,	4½	4½	110	—	4 1 10
Do. 1963–93	,,	—	3½	101	—	3 9 4
London & Home Counties, 1955–75	,,	4½	4½	112	+2	4 0 4
London Passenger Transport, A...	,,	—	4½	121½	—	3 14 0
Do. do. B...	,,	—	5	125½	—	3 19 6
Do. do. C...	,,	—	3	86½	+½	3 9 5
West Midlands Joint Elec. 1948–68	,,	—	5	115	—	4 7 0
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	114½	+2	7 17 3
Anglo-Am. Tel. Pref.	Stock	6	6	114	+1	5 5 2
Do. Def.	,,	1½	1½	27½	—	5 9 1
Cables & Wireless 5½% Pref.	,,	2¾	2¾	78	+½	3 10 6
Do. A. 7½% Ord.	,,	Nil	Nil	18	+½	—
Do. B. Ord.	,,	Nil	Nil	7½	-½	—
Globe Tel. and T. Ord.	10	Nil	2½	9¾	—	2 11 8
Do. do. Pref.	10	6	6	12½	—	4 16 0
Great Northern Tel.	10	20	20	37	—	5 8 1
Marconi-Marine	1	10	7½	32/6	—	4 12 4
Oriental Telephone Ord.	1	12	12	3⅞	—	*3 15 3
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	6	-1½	—
British Electric Traction Df. Ord.	,,	5	5	800	+25	—
Do. do. Pref. Ord.	,,	8	8	163½	—	4 17 10
Brazil Traction	100	—	—	12	—	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	105	—	4 15 3
Mexico Trams, 5% Bonds	—	5	5	17½	-2½	—
Mexican Light Common	100	Nil	Nil	2½	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	—	5	5	38	—	—
Victoria Falls Ord.	1	15	20	6½	—	3 1 6
Yorkshire (West Riding)	1	2½	5	25/-	—	4 0 0
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	10	10	3½	+⅛	2 17 2
Assoc. Elec. Ord.	1	4	3	22/-	—	2 14 7
Do. Prf.	1	8	8	32/6	—	4 18 6
Babcock & Wilcox	1	9	6	43/6	—	2 15 0
British Aluminium Ord.	1	5	5	29/6	—	3 7 9
British Insulated Ord.	1	15	15	76/3	+⅛	3 18 9
Brush Ord.	Stock	Nil	Nil	43	-2	—
Callender's	1	15	15	3¾	+⅛	4 9 0
Do. 6½% Pref.	1	6½	6½	31/3	—	4 3 2
Crompton Parkinson Ord.	5/-	22½	12½	30/-	+½	2 1 8
Do. 8% Pref.	1	8	8	33/9	—	4 14 10
Edison-Swan 1st Pref.	1	7½	7½	22/6	—	6 13 4
Do. 5% Deb.	Stock	5	5	107½	—	4 13 0
Electric Construction	1	Nil	Nil	13/9	—	—
Enfield Cable Ord.	1	25	20	4¾	+¼	4 6 7
English Electric	1	Nil	Nil	5/9	—	—
Do. do. Pref.	1	Nil	Nil	11/3	—	—
Ever Ready	5/-	35	35	27/-	—	6 9 8
Ferranti Pref.	1	7	7	28/6	+6d.	4 18 3
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	8	8	45/9	-6d.	3 9 10
Henley's	1	30	30	6½	+⅛	4 12 4
Do. 4½% Pref.	5	4½	4½	5¾	+¼	3 18 3
India-Rubber Preferred	1	—	—	1	—	—
Johnson & Phillips	1	5	5	30/-	-9d.	3 6 8
Siemens Ord.	1	6½	4	1	—	4 0 0
Telegraph Construction	£1	Nil	Nil	1½	+¼	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1932

35486. "Manufacture of insulated electric conductors." W. Singleton, W. Hulme, B. Jones and Goodlass, Wall & Lead Industries, Ltd. December 14th, 1932. (Divided application on 34891/32.) (416568.)

1933

1121. "Coin mechanism for gas and electricity meters and the like." United Gas Industries, Ltd., E. W. Smith and A. Charles. January 12th, 1933. (416570.)

4433. "Electromagnetic vibratory devices for use in the electrical reproduction of sound." Electric & Musical Industries, Ltd., and J. White. February 13th, 1933. (416574.)

4434. "Television or the like transmission systems." Electric & Musical Industries, Ltd., M. Bowman-Manifold and E. C. Cork. February 13th, 1933. (416720.)

5066. "Lifts." Express Lift Co., Ltd., and J. W. Stevens. February 18th, 1933. (416781.)

5069. "Electric heaters." General Electric Co., Ltd., O. W. Humphreys and E. J. B. Pearson. February 18th, 1933. (416576.)

5190. "Electric gaseous discharge devices." General Electric Co., Ltd. February 19th, 1932. (416783.)

5584. "Television, picture telegraph, and the like transmitters." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett and R. Cadzow. February 23rd, 1933. (416848.)

7616. "Material for use in the magnetic circuit of inductance coils carrying high-frequency currents." V. G. Van Colle and Ward & Goldstone, Ltd. March 13th, 1933. (416583.)

7896. "Television and the like transmitting systems." Electric & Musical Industries, Ltd., and C. O. Browne. March 15th, 1933. (416723.)

7959. "Metal casing for electric incandescent tubular lamp reflectors." W. Gudlevsky and H. Gudlevsky (trading as Woolf & Harris). March 16th, 1933. (416724.)

8009. "Insulated electrical conductors." Telegraph Construction & Maintenance Co., Ltd., and W. F. Randall. March 16th, 1933. (416725.)

8027. "Telephone systems." Automatic Electric Co., Ltd., R. Taylor and G. T. Baker. March 16th, 1933. (416851.)

8028. "Traffic-control signals." Automatic Electric Co., Ltd., A. P. B. Renshaw and D. Wright. March 16th, 1933. (416588.)

8087. "Electric heating appliances of the open-grid or boiling-plate type." N. W. Gilbert. March 17th, 1933. (416787.)

8189. "Extensible electric conductor cords." F. Meiwald. March 24th, 1932. (416788.)

3559. "Submarine electric signalling systems." Electrical Research Products, Inc. March 31st, 1932. (416795.)

8777. "Carrier-current signalling systems." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). March 23rd, 1933. (416866.)

8778/9. "Repeating stations for telephony and like systems." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). March 23rd, 1933. (416866/7.)

8807/8. "Electric circuit-breakers." Westinghouse Electric & Manufacturing Co. March 23rd, 1932. (416683/4.)

8932. "Dynamo regulators." C. A. V. Bosch, Ltd., W. H. Glaser and N. R. Wood. March 24th, 1933. (416873.)

10995. "Electric condensers." Elektrizitäts Akt.-Ges. Hydrawerk. April 20th, 1932. (Addition to 410807.) (416735.)

11196. "Operation of electric flame arc furnaces." Akt.-Ges. Brown Boveri et Cie. February 8th, 1933. (416876.)

12707. "Electric kettles, urns, and the like." F. Baker, Ltd., A. Baker, W. H. Baker and H. E. Baker. May 2nd, 1933. (416596.)

12933. "Electric coupling devices." General Electric Co., Ltd., and W. Manchester. May 3rd, 1933. (416690.)

13615. "Electric switch contacts." Siemens Bros. & Co., Ltd., and P. C. Sims. May 10th, 1933. (416692.)

15847. "Joints for high-tension electric cables." Callender's Cable & Construction Co., Ltd., L. G. Brazier, M. Stienon, and H. J. Alcock. June 1st, 1933. (416695.)

16200. "Controllers for electric motors." English Electric Co., Ltd., and S. A. Smith. June 6th, 1933. (416696.)

21271. "Manufacture of photo-electric cells." General Electric Co., Ltd., and C. H. Simms. July 28th, 1933. (416703.)

21290. "Electrical switchgear." D. R. Davies and Associated Electrical Industries, Ltd. July 28th, 1933. (Addition to 395088.) (416704.)

21319. "Electrically heated vulcanising apparatus." W. T. Henley's Telegraph Works Co., Ltd., and W. C. Barry and H. C. Hoban. July 29th, 1933. (416812.)

21482. "Circuits for the reception of electrical signals by means of carrier waves." General Electric Co., Ltd., and E. P. L. Westall. July 31st, 1933. (416705.)

23955. "Protective electrical circuits for power lines and the like." Siemens-Schuckertwerke Akt.-Ges. September 24th, 1932. (Addition to 22204/33.) (416609.)

25638. "Modulated carrier-wave transmitting apparatus." Marconi's Wireless Telegraph Co., Ltd. September 30th, 1932. (Cognate application 25639/33.) (416707.)

26417. "Apparatus for the regulation of a plurality of electric lighting units supplied with alternating current." Siemens-Schuckertwerke Akt.-Ges. May 11th, 1933. (416815.)

26509. "Electric brake control for vehicles." Grebert et Cie. September 26th, 1932. (416750.)

26818. "Containers for condensers and other electrical apparatus of a static nature." Dubilier Condenser Co. (1925), Ltd. October 12th, 1932. (416751.)

27025. "Manufacture of lustrous carbon resistances." Elektrische Gluhlampenfabriken J. Kremenesky Akt.-Ges. October 12th, 1932. (416752.)

29140. "Electric discharge tubes." M. Fischer, M. Fischer, and H. Fischer (trading as Glaswerk G. Fischer). May 20th, 1933. (416616.)

32997. "Protecting and warning tiles for laying above underground electric cables." A. J. Howard. November 25th, 1933. (416760.)

33769. "Vibration and electric massage apparatus." M. Horsky and H. Bronner. December 1st, 1933. (416762.)

36008. "Manufacture of electric cables." Okonite-Callender Cable Co., Inc. December 21st, 1932. (416623.)

36611. "Vapour generators intended particularly for mercury." British Thomson-Houston Co., Ltd. December 29th, 1932. (416769.)

1934

690. "Means for protection against overloads, short-circuits, and back-firing in mercury-vapour rectifiers." Akt.-Ges. Brown, Boveri et Cie. January 7th, 1933. (416822.)

1245. "Safety device for three-phase current motors for breaking the circuit in the event of overloading or overheating." K. Stein (née Wensske). January 12th, 1934. (416772.)

2650. "Electrical heater elements for use in permanently waving the hair." G. M. Clark (Frigidine Products, Inc.). January 25th, 1934. (416627.)

(3703.) "Electromagnetic brakes." Igranic Electric Co., Ltd. February 6th, 1933. (416894.)

4482. "Electric switch-fuses." English Electric Co., Ltd., A. M. Pooley and A. A. Heath. February 10th, 1934. (416633.)

5092. "Electrolytic condensers." Elektrizitäts Akt.-Ges. Hydrawerk. February 21st, 1933. (416896.)

8103. "Means for controlling and indicating the setting of apparatus for modulated carrier- wave reception." Electric and Musical Industries, Ltd., and F. A. Mitchell. March 14th, 1933. (Divided application on 7776/33.) (416775.)

8902. "Electrolytic cells." R. Armbrust. March 21st, 1934. (416900.)

9475. "Variable high ohmic resistance." Bang & Olafsen Aktieselskab. March 27th, 1933. (416902.)

12189. "Electric power control systems employing electric power converting apparatus, particularly of the vapour-electric type." A. S. Fitzgerald. December 17th, 1932. (Divided application on 35857/32.) (416906.)

12192. "Cathode-ray oscillograph arrangements." A. C. Cossor, Ltd. April 21st, 1933. (416834.)

12297. "High ohmic resistance provided with a protective coating of varnish." Elektrische Gluhlampenfabriken J. Kremenesky Akt.-Ges. April 27th, 1933. (416835.)

14512. "Electric plug-and-socket connections." English Electric Co., Ltd., and A. A. Heath. May 14th, 1934. (416837.)

14785. "Device for locating faults in electrical conductors." R. Holt. May 16th, 1934. (416651.)

15991. "Fusible electric cut-out elements." English Electric Co., Ltd., A. M. Pooley and M. A. B. Landers. May 29th, 1934. (Addition to 341281.) (416656.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 10th :—

Humaswitch. No. 551771. Class 8. Capacity-controlled apparatus for operating burglar alarms, advertising display apparatus and the like.—Human Switch, Ltd., 110, Jermyn Street, S.W.1.

Airflo. No. 553455. Class 8. Radio receiving and transmitting sets and parts thereof.—Radio Instruments, Ltd., Madrigal Works, Purley Way, Croydon, Surrey.

Telelux. No. 553027. Class 8. Television apparatus and parts thereof.—British Television Supplies, Ltd., Bush House, Aldwych, W.C.2.

Engineering Economic Study Groups

THE newly formed Liverpool and District Engineers' Economic Study Group met at Reece's Bank Café, Liverpool, on October 11th, when the chairman, Mr. H. H. Harrison, M.Eng., M.I.E.E., delivered an address to a representative engineering audience. He said that the economist had repeatedly shown himself to be wrong, and engineers now thought it time that they investigated some of the problems affecting their industry in their own way. They even dared to hope that the application of the scientific method to production might to some extent help to solve the problem of distribution which was the cause of many of our present troubles.

It was for this purpose that the group had been formed to act along non-party lines and independent of any political organisation. Mr. J. W. Thomas followed with an account of the activities of the Manchester Engineers' Economic Study Group. The next meeting of the Liverpool group will be held on October 25th at the same place. Mr. W. Parry, 67, Farnworth Street, Liverpool, will welcome inquiries.

The first of the monthly meetings of the session of the Engineers' Economics Study Circle in London is to be held at Denison House, 296, Vauxhall Bridge Road, Victoria, S.W., on Wednesday next at 8 p.m., Sir Richard Paget presiding. Lord Melchett will deliver an address on "National Progress in Relation to the Monetary System," and an informal discussion will follow. Readers will be welcomed. Applications for tickets should be made to the honorary secretary of the group, Mr. A. H. Hayes, Hazlitt House, Southampton Buildings, Chancery Lane, W.C.2.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Andover.—Public offices for the U.D.C.; Dunning & Manning, builders, Weyhill.

Arbroath.—Houses (96); burgh surveyor.

Birmingham.—Offices (£57,000) for John Wright & Eagle Range; T. W. Edwards & Sons, Stourbridge.

Atherstone.—Co-operative stores and housing accommodation at Coleshill Road for Atherstone Industrial Co-operative Society, Ltd. (electrical work); R. A. Fox, builders, 180, Long Street.

Bathgate.—Houses (76), Baldordic site, and 36 houses, Council Road; A. L. Reid, burgh surveyor, 32, Hopetown Street.

Batley.—Houses (40), Purlwell House Estate; borough surveyor.

Bedwas and Machen.—Houses (100), Trethomas, for Housing Corporation of Great Britain.

Bolton.—Co-operative stores for Bolton Co-operative Society, Ltd. (electrical work); J. & N. Dickinson (1922), Ltd., builders, 37, St. George's Road.

Bournemouth.—Extensions, including operating theatre and general ward, Boscombe Hospital; secretary.

Boyle.—Houses (34) and constructing a septic tank, &c., at County Roscommon, for Boyle Town Commissioners; McDonnell, Dixon & Downes, architects, 20, Ely Place, Dublin.

Bridgwater.—Cinema, Penel Orlieu (£20,000); Odeon Pictures, Ltd.

Brighton.—Municipal airport buildings; S. H. Tiltman, architect, 42, Middle Street.

Bromley.—School (400 places) and clinic, Prince's Plain, for Borough E.C.; F. H. Wood, Gloucester House, 19, Charing Cross Road, London, W.C.

Carnforth.—Congregational Church on Church Brow Farm (electrical work); R. L. Dilworth, Ltd., builders, Damside Street, Lancaster.

Cheshire.—Primary school, Eastham (£10,000), for County E.C.; director of education, Chester.

Chesterfield and Bolsover.—Central offices, houses and workshops for Water Board; Houfton & Kington, architects, Market Place, Chesterfield.

Chorley Wood.—Church hall (£4,000); R. Hewett, Ltd., builders, Acton Green.

Cottingham.—Houses (90), off Priory Road (electrical work); F. Bilton, 86, Wincolmlee, Hull.

Crawley.—Church at Three Bridges; MacDonald Gill, architect, 1, Hare Court, London E.C.; H. J. Jenner, builder, Three Bridges.

Cumberland.—Additions to Keswick casual wards for C.C.; J. Forster, county architect, 4, Alfred Street North, Carlisle.

Dartford.—Houses (168), Princes Road; J. Franklin. Cinema at Spital Street; Stanley Beard & Bennett.

Derbyshire.—School, Newhall, Swadlincote, for the county E.C.; director of education, Derby.

Dewsbury.—Houses (64), Dawgreen; borough architect.

Douglas (I. o. M).—Alterations to Grand Theatre, Victoria Street; Theatre Co.

Dukinfield.—Houses (38) at King Street and the Lakes Estate (electrical work); W. H. Brown & Son, Burlington Street, Ashton-under-Lyne.

Dunchurch.—Methodist church (electrical work); W. H. Adams & Sons, Ltd., builders, Rugby.

Eccles.—Extensions to Co-operative stores at Higher Irlam for Eccles and District Co-operative Society, Ltd. (electrical work); Brew Bros., builders, Cadishead.

Ennis.—Alterations to premises; Robinson & Kerfe, architects, 8, Merrion Square, Dublin.

Filey.—Houses (100); U.D.C. surveyor.

Flint.—Houses on the Mount Pleasant Estate (electrical work); T. B. Gorst & Sons, Min-y-don, Old Colwyn.

Formby.—Houses (32), Little Altcar (electrical work), for J. W. Stevens.

Glasgow.—Houses (136), Hillington Park, shops and flats, East Keppoch; housing director. Factory for J. Noonan, 61, Vinegarhill Street; Gillespie, Kidd & Coia, architects, 239, St. Vincent Street. Additions to Rosehill Works, Polmadie; Gardner & Gardner McLean, architects, 6, India Street. Works extensions, Greenhead; James Templeton & Co.

Glossop.—Houses (36); borough surveyor.

Golborne.—Houses (300); U.D.C. surveyor.

Grimsby.—Methodist Central Hall in Duncombe Street (£30,000) (electrical work); A. Brocklehurst & Co., architects, Martin's Bank Buildings, 10, Norfolk Street, Manchester.

Haydock.—Houses (42) at Kenyon's Lane; U.D.C. surveyor.

Hazel Grove.—Alterations and additions at Hazel Grove Police Station for Cheshire County Council (electrical work); Vernon & Smith, builders, Station Street.

Heene.—Church; H. Milburn Pett, diocesan architect, Chichester.

Hemsworth.—Laundry at Isolation Hospital with the installation of machinery to provide for dealing with 120 beds, for the Joint Hospital Committee (electrical work); J. Minnikin, 53, Rotherham Road.

Hinckley.—Extensions to works of W. Moore & Osborne, Ltd. (electrical work); J. H Mason & Sons, Ltd., builders, Factory Road.

Hyde.—Houses (30), Garden Street; borough engineer. Works extensions, Muslin Street; Imperial Chemical Industries, Ltd.

Keighley.—Bazaar stores, Low Street, for Marks & Spencer, Ltd. (electrical work); Bovis, Ltd., builders, 35, High Street, Marylebone, London. Extensions to premimses at Lawkholme Crescent for Halifax Building Society (electrical work); T. Moore & Sons, builders, Alice Street.

Kent.—Children's nursery and engineering services in connection with the installation of a heating and hot water system at the Thanet Institution, Minster, for the C.C.; W. H. Robinson, county architect, Springfield, Maidstone.

Kingston-on-Thames.—Schools, Latchmere Lane, for Borough E.C.; director of education.

Lanarkshire.—Child welfare centre, with library, &c., Bellshill, for C.C.; county architect, Hamilton.

Leicester.—New premises for John Lewis & Co., Ltd., Humberstone Gate; G. de C. Fraser, architect.

London.—(ACTON).—Day nurseries at Bollo Bridge Road and Palmerston Road; borough engineer. Factory at Warple Way for C. A. V. Bosch, Ltd.; Hobden & Porri, architects. Factory extension at Gorst Road for Fenriss, Ltd. Municipal office extensions (£29,000); borough engineer. Bacon factory at Atlas Road for T. Wall & Sons; J. P. Simpson, architect. Factory extensions at Wales Farm Road; Telegraph Condenser Co. (EALING).—Houses (60), Cow Lane; borough engineer. Development of Greenford Road Estate; borough engineer. Houses (40), at Conway Crescent; R. Lancaster & Sons. Houses (32), at Conway Crescent; B. Smith & Sons (Builders), Ltd. School on Selborne site; borough engineer. Flats (84), at Ruislip Road; Vale Estates (Chesham), Ltd. Flats (132), pavilion and garages (62) at Hanger Lane, for Bell Property Trust, Ltd.; Toms & Partners. Houses (111), at Reading Road; Hayes Bridge Estates, Ltd. Flats (120), at Queens Drive, for Hanger Hill Garden Estates, Ltd.; D. H. Smith. Houses (93), at Brunswick Road, for Bloomfield Building Co., Ltd.; J. M. Wilson. Houses (42), at Clare Road; Clayton Farm Estate Co. (KENNINGTON).—School, Bowling Green Street; L.C.C. architect. (TOTTENHAM).—Swimming bath; U.D.C. engineer.

Manchester.—Parochial hall at Moorside for the Parochial Council of Holy Rood Parish Church (electrical work); C. Musker Bros., Ltd., builders, Bingham Street, Swinton.

Margate.—Houses (37), St. Peter's Footpath site; borough surveyor.

Marlow.—Houses (41), at Seymour Court Road; U.D.C. surveyor.

Middlesex.—Council school in Dawlish Drive, Ruislip, for Education Authority; office of the county architect, 10, Gt. George Street, S.W.1. Extensions, Byron Court Council School, Spencer Road, North Wembley; H. M. Walton, secretary to E.C.

Midlothian.—Houses (100), West Calder; county clerk, Edinburgh.

Monmouthshire.—School at Rumney, for the County E.C.; director of education, Newport.

Morecambe.—Reconstruction of pavilion on central pier (£30,000), (electrical work); C. B. Pearson & Son, architects, 18, Dalton Square, Lancaster.

Motherwell.—Houses (136), Meadowhead, Wishaw; Lewis Costley, burgh surveyor, Town Hall.

Northamptonshire.—Elementary school (600 pupils), on Corby-Rockingham Road, for C.C.; J. L. Holland, secretary for education, County Education Offices, Northampton.

Norwich.—Extensions to Poor Law Institution (£9,900); city engineer. Houses (50), (£18,250); city engineer.

Paignton.—Schools at Preston and Collaton; Devon Education Committee.

Prestonpans.—Houses (78), West Loon; J. F. Rowberry, burgh surveyor, 114, High Street.

Rowley Regis.—Houses (108), Rowley Hall Estate; borough surveyor.

Rugby.—Showrooms and offices for S. Robbins, Ltd (electrical work); Fraser & Lumsden, architects, 10a, Temple Row, Birmingham.

Salisbury.—Houses (42), Pembroke Park Estate; Building & Public Works Construction Co., Ltd., Swindon.

Scarborough.—Houses (208), Prospect Mount Estate; borough engineer.

Sheffield.—Three schools (1,600 pupils each) on the Arbourthorne Estate (electrical work); W. G. Davies, city architect, Town Hall.

Slough.—Houses (1,000), Bath Road, Cippenham (electrical work); F. Iona-Smith and G. Wrighton-Ibbs, builders.

Spalding.—Methodist Chapel and Sunday school for Clough Street Methodist Church (electrical work); Barnsdale & Sons, builders, Donington.

Stockton-on-Tees.—Houses (59), and extensions to fire station (£3,190); borough surveyor.

Surrey.—Schools, Chessington, West Molesey and Merton, for County E.C.; secretary, Kingston-on-Thames.

Swadlincote.—Sewage works (£51,383); Hussey, Egan & Pickmere, Ltd., Birmingham.

Swanage.—Business stores and dance hall for Bournemouth Markets Ice & Cold Stores, Ltd., Holdenhurst Road.

Twickenham.—Senior school, Meadway; borough engineer.

Urmston.—Houses (58), at Flixton (electrical work); D. Franklyn, builder, 423, Moorside Road. Houses (58), at Davyhulme (electrical work); E. & J. Slater, builders, 111, King Street, Stretford. Houses (60), at Davyhulme (electrical work); A. Locke, Ltd., builders.

Watford.—Houses, Water Lane, and public hall, Leavesden Green housing estate; borough engineer.

Wellington (SOMERSET).—Houses (30), Foxdown, for E. Twyford.

Wexford.—Wing at St. Peter's College; T. J. Cullen, architect, 25, Suffolk Street, Dublin.

Wicklow.—Cottages (42) at various sites in the C. Health District; P. W. Sheehan, secretary, Boardroom, Rathdrum.

Wigan.—Houses (34) at Woodhouse Lane (electrical work); J. Lancaster, builder, Holt Street.

Wiltshire.—Police station, Bradford-on-Avon, for the C.C.; county architect, Trowbridge.

Windsor.—Extensions to Onslow and Hammersley school (electrical work); H. W. Smith, architect, London.

York.—Extension of the York Mill Mount secondary school for the Education Committee; Penty & Thompson, architects. Yorkshire Penny Bank Chambers, Coney Street.